# Does Foreign Aid Reduce Poverty? Evidence from Niger

Pedrosa-Garcia, Jose Antonio

University of Cape Town

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Jose Antonio Pedrosa Garcia[ξ]

University of Cape Town[φ]

**Abstract**

This paper analyses empirically whether foreign aid is associated with poverty reduction at household level in Niger. Evidence suggests that aid is correlated with poverty, to be expected when the poor are targeted. However, the study finds *increases* in poverty in communities that received aid projects. Further exploration reveals that poverty changes among aid-recipient households are not different to those among households receiving no projects at all. However, households benefiting from aid underperformed those who benefited from development projects *by other donor types*. Knowledge of local conditions seems to be the reason: when projects are funded by foreign aid only, poverty does not change, but when aid co-funds projects with other types of donor, poverty decreases. The implications are important: first, foreign aid requires coordination with other providers of public goods, which is always difficult, especially in a context of poor institutional capacity such as Niger's. Second, the models estimated allow the prediction of the benefits a specific project would bring to a given household, which would allow Niger's policymakers to coordinate donors' initiatives to maximize their effectiveness – although such coordination may involve having to reduce the least efficient donors to mere providers of finance, a role they might not be willing to accept. And finally, poverty can be reduced, but for that, there is a minimum number of home-grown interventions which households should benefit from.

Key words: Foreign aid, Official Development Assistance, Poverty reduction, Niger

[ξ] School of Economics, University of Cape Town. Email: jose.pedrosa@aya.yale.edu

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## *1. Introduction*

Analysing the impact of foreign aid is arguably the most important aspect in the debate about aid. At a macro level, this has traditionally been explored through aid-growth regressions, an approach that assesses the statistical relationship between aid and economic growth, used as early as the 1970s (Papanek 1973). Another possibility is to relate aid to an objective other than growth, such as poverty or human development. This methodological approach has tended to gain favour over the years, thanks to increased data availability. Poverty is arguably the variable of highest interest, but due to a lack of reliable internationally comparable poverty data, studies have often used health and education indicators (e.g. infant mortality and illiteracy rates) as proxies for poverty (Alvi, Senbeta 2012). Thus, it has been contended that globally, aid has no significant impact on infant mortality, primary schooling ratio or life expectancy (Boone 1996). More recently, it has been noted that health aid has a statistically significant effect on infant mortality: doubling per capita health aid is associated with a 2 percent reduction in the infant mortality rate (Mishra, Newhouse 2007). It has also been asserted that while Non-Governmental Organisations' (NGOs) aid reduces infant mortality, there is no evidence that bilateral aid reduces infant mortality and illiteracy rates (Yontcheva, Masud 2005). Kosack considers Human Development Index (HDI) as the dependent variable, finding that foreign aid does not affect HDI by itself, although when combined with democracy, aid is positively associated with improvements in HDI (Kosack 2003). This finding (that the impact of aid is influenced by the political regime) is common in the literature (e.g. Boone 1996), although not universally accepted. After conditioning on the state of democracy, Arvin and Barillas indicate that in some cases aid disbursement and poverty reduction are not linked (Arvin, Barillas 2002). The studies identified relate to global samples over large periods of time, e.g. 97 developing countries from 1971 to 1990 (Boone 1996), 79 countries from 1981 to 2004 (Alvi, Senbeta 2012) or 58 countries from 1990 to 2001 (Yontcheva, Masud 2005). Under such a structure the use of average income, health and education indicators neglects within-country distributional aspects, i.e. even if there is an increase in per capita income or reduction in infant mortality due to aid, it remains unclear whether the poor are the beneficiaries of development assistance (Alvi, Senbeta 2012). To address this, Alvi and Senbeta assess the role of aid in poverty reduction after controlling for average income, redistribution components of changes in poverty and a set of covariates identified as growth-enhancing policies and institutions. Their results suggest that foreign aid is associated with declines in poverty as measured by poverty rate, poverty gap index and squared poverty gap index (Alvi, Senbeta 2012).

In recent years, the approach to research on foreign aid has evolved towards more micro issues, such as whether aid is associated with specific subsector results, e.g. by investigating the extent to which aid aimed at private sector development responds to constraints identified by private firms as problems (Ferro, Wilson 2011). Another option is to focus only on one country, which can be useful to capture idiosyncratic characteristics affecting the relationship between aid and poverty (Arvin, Barillas 2002). For instance, economists often neglect the fact that people benefit from development projects from sources other than aid (e.g. Government, civil society, etc.). This neglect may be rooted in lack of data on development projects' funding, but its consequences are important, e.g. aid coordination is one of the five pillars of the Paris Declaration for Aid Effectiveness (OECD 2006) and its lack leads to fragmentation, which is linked to duplication of efforts and wasting of resources.

Despite its potential to enrich the debate on aid effectiveness, research at national level has only become popular since the 1990s (De, Becker 2015), and not everywhere. Some countries have been the object of much research regarding the aid they receive. In Sub-Saharan Africa, the impact of aid in Uganda has been analysed under several lenses: its political economy (Oloka-Onyango, Barya 1997), the effects of its environmental programs (Kateregga 2013), its ability to lead to democracy relative to other countries (Hearn 1999), or its capacity to reach the final beneficiaries. Notably, an evaluation of

a grants-transfer program to schools found that between 1991 and 1995, on average the schools received only 13 percent of the grants (Reinikka, Svensson 2004).

However, many countries are still ignored. For instance, a survey of previous works shows that Niger has been conspicuously under-researched, considering either aid's effect on poverty or any other dimension. This lack of attention to Niger is rather surprising, because it is one of the poorest countries in the world, has received aid since its independence in 1960 and its progress on aid effectiveness has been reported as elusive, e.g. only one of 13 targets of the Paris Declaration on Aid Effectiveness were achieved between 2005 (baseline) and 2010 – some indicators deteriorated (OECD 2012). Previous works on Niger have focused on the results of aid at a macro level: whether it is associated to growth (Nafiou 2009), and how much more aid would be required to achieve some defined growth targets (Farah, Sacerdoti & Salinas 2009). It has been stated that in Niger, ODA has a positive effect on growth (Nafiou 2009). This macroeconomic relationship has been quantified for Niger as follows: "If foreign aid as a share of GDP were to be permanently increased from the equivalent of 10 percent of GDP in 2007 to 15 percent in 2008, annual economic growth would accelerate by more than 1 percentage point, without generating significant risks for macroeconomic stability" (Farah, Sacerdoti & Salinas 2009, p.3). At a micro level, the scarcity of research is more blatant, the few exceptions consisting in qualitative studies (Sambo 2009) and field project descriptions (Rossi 2006).

This paper represents an attempt to reduce this void, as it explores the relationship between foreign aid and poverty at household level in Niger. Evidence suggests that aid is correlated with poverty – which is to be expected when the poor are targeted. However, the study finds *increases* in poverty in communities that received aid development projects. Further exploration reveals that changes in poverty among aid-recipient households are not statistically different to those among households receiving no projects at all. However, households benefiting from aid projects underperformed those who benefited from development projects by other types of donors. Knowledge of the local conditions seems vital: when development projects are funded by aid only, poverty does not change (it slightly increases), whereas when aid co-funds projects with other donor types poverty does decrease. Furthermore, the relationship between number of projects and poverty reduction is non-linear: to reduce poverty a household should benefit from about 18 projects.

These findings have profound implications. First, the models estimated allow the prediction of the benefits a given project could provide to a specific household. Such predictive abilities would allow policymakers to coordinate donors' initiatives to maximize their effectiveness. Second, as a source of public goods at household level, aid requires coordination with other providers of public goods, although at present Niger may lack the capacity to achieve such coordination. Third, improvements of development interventions based on these results may involve having to reduce the least efficient donors to mere providers of finance (e.g. channelling their resources through other donors), a role they might not be willing to accept. Finally, the findings support the idea that there is a minimum number of home-grown interventions required to achieve the economies of scale that lead to poverty reduction at household level.

The rest of the paper is structured as follows. Section 2 describes the data and methodology used, while section 3 presents the results of the analysis and section 4 concludes.

## 2. *Data and Methodology*

This section describes available data, research hypotheses and the methodological approach adopted. Data are from a National Survey on Household Living Conditions (ENCVM)[1] undertaken in 2005 by Niger's National Statistics Institute (INS)[2]. The objective of the ENCVM was to evaluate poverty. Its methodology was that of Core Welfare Indicators Surveys (INS Niger 2007).[3] The survey targeted ordinary Nigerien households except those of diplomatic personnel. It covered the entire national territory except the department of Bilma due to cost–accessibility reasons (INS Niger 2007).[4] The ENCVM's sampling methodology was stratified at 2 levels. First, each of the 7 regions was divided in 2 sub-regions (urban and rural), which led to 14 strata plus the capital (15 strata in total).[5] Next, primary sampling units (*zones de dénombrement* in French, ZD) were selected from each stratum, proportional to their size in number of households. In total, 335 ZDs were selected and 20 households were sampled per ZD, which led to a sample of 6,700 households. Of those, ten households could not be surveyed because they were nomadic, which led to the final sample of 6,690 households. The equivalence between households and individuals is given by survey weights (INS Niger, Banque Mondiale 2006). According to this sample, the country's population was estimated at 12,627,063 people. The ENCVM questionnaire contained four modules: general household characteristics such as general education or health; income and expenditures; savings and credit; and community perception and activities.

The community module collected data on the development projects which households saw implemented in their community between 2000 and 2005. Key selected questions are shown in the annex (Figure 2). Households were asked if any development project had taken place in their community; if so, what it consisted of, who funded it, and how much the household's living conditions improved as a result. Data were also collected on the change in access to education, health, water, electricity and justice during the period of reference. Poverty was explored in the ENCVM objectively and subjectively. Objectively, households were asked to quantify their expenditures, which allowed the estimation of the country's national poverty level: a person was considered poor if his/her annual expenditures were equal to or lower than 144,750 FCFA (275 USD) in an urban environment, and 105,827 FCFA (201 USD) in a rural setting (INS Niger, Banque Mondiale 2006).[6]

Based on this poverty line, 62.1% of the country's population was estimated to be poor (INS Niger, Banque Mondiale 2006). Subjectively, households were asked to self-evaluate their poverty level in 2000 and in 2005, on a Likert scale from 0 (wealthiest) to 9 (poorest). This allows for a calculation of the change in their self-assessed poverty. The frequency distribution of poverty for both years is shown in the annex (Figure 3 and Figure 4). The relationship between objective and subjective poverty in 2005 is robust despite the existence of outliers (Figure 5).[7] Households' expenditures and their self-assessed poverty in 2005 are significantly correlated, with the cut-off of 6 in the Likert scale being the best match, i.e. objectively-poor households tend to self-evaluate their poverty between 6 and 9 (INS Niger, Banque Mondiale 2006).

Impact evaluation is performed by comparing a group or subject that has been exposed to a specific intervention (treatment group) with one that hasn't (control group). In this setting, the structure of the groups is depicted in Figure 1.The treatment group is composed of households who benefited from at least one aid-funded development project (G1a), while the main control group is composed of those

[1] *Enquête Nationale sur les Conditions de Vie du Ménage 2005 (ENCVM)*

[2] *Institut National de la Statistique (INS)*

[3] *Questionnaire des Indicateurs de Bien Etre de base (QUIBB)*

[4] Bilma is in the North-East of the country, in the Sahara Desert, and hosts only 0.2% of the population, mostly nomads.

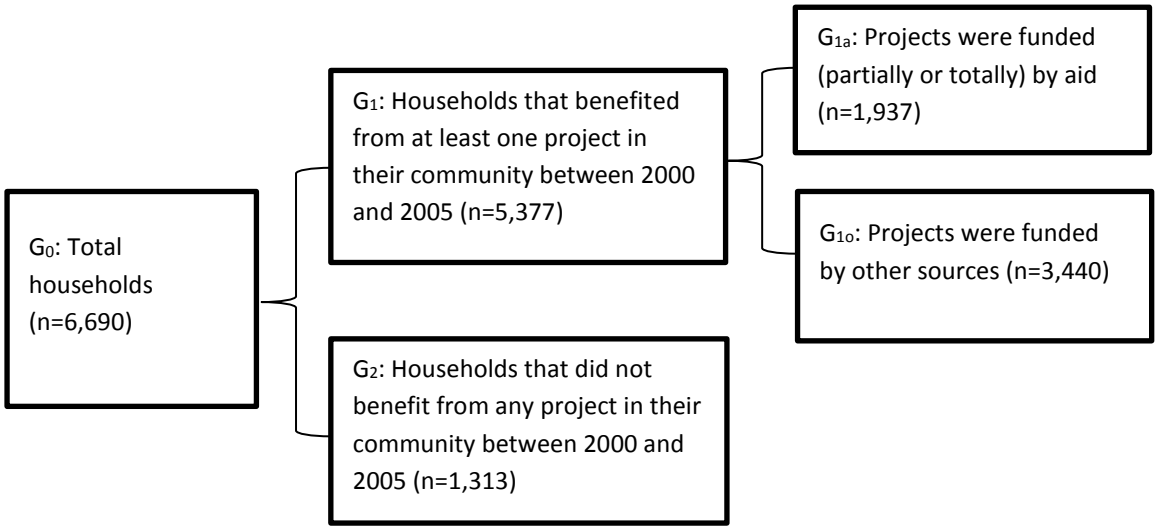
[5] Niger's capital is administered separately, referred to as the "*Communauté Urbaine de Niamey*"

[6] Exchange rate used is 1 USD = 526.3 FCFA (as of 16 December 2014)

[7] Few wealthy households stated that they are poor (no poor households claimed to be wealthy).

households who did not (G2+G1o). The control group thus defined comprises two sub-groups: households who did not benefit from any project at all (G2), and those who benefited from projects by sources other than aid (G1o).

Figure 1. Overall scheme of this research (n denotes number of households with available data)




The objective is to assess if households who benefit from aid projects (G1a) show significant changes in poverty relative to i) those who do not benefit from aid (G2+G1o), ii) those who benefit from no project at all (G2), and ii) those who benefit from 'non-aid' development projects i.e. those provided by other sources such as Government, civil society, etc. (G1o). Formally, the null and alternate versions of the research hypothesis are stated in equations (1-1) to (1-2):

$$H_0: PC_A - PC_C = 0 \quad (1\text{-}1)$$

$$H_1: PC_A - PC_C \neq 0 \quad (1\text{-}2)$$

Where:

$PC_A$: Poverty change of households that benefited from aid projects (group G1a)

$PC_C$: Poverty change of households in control group (for the 3 groups noted)

This research setting and available data offer several key advantages. First, it is possible to discriminate between development projects in general (i.e. regardless of funding source[8]) and those development projects funded by aid.[9] Furthermore, the sample of households is large and appears representative of the country's population. Third, although the ENCVM data is mainly cross-sectional, there are variables with information about changes in time, so in addition to cross-sectional analysis it is possible to estimate differences-in-differences. Similarly, consistency checks between objective and subjective poverty indicators are possible. Moreover, it is possible to distinguish between aid projects funded solely by aid or co-funded with other donor types, which is useful when exploring any differences induced by coordination between donors. Although the number of projects was not explicitly requested,

[8] Besides aid, the possible answers given to respondents in the ENCVM were government, Special Program of the Republic's President, community, private investor, religious community, other.

[9] Throughout the paper, projects are consistently referred to as falling into the following categories: development projects (all projects regardless of funding source), projects from other sources, aid projects (those implemented by an aid donor, and which may be co-funded or not), and aid-only projects (aid projects funded only by aid).

it can be calculated from the data. Consequently, while the hypothesis is formulated under a discrete approach (project – no project), the same framework can be used to assess whether the number of projects is associated with changes in poverty. Finally, from the perspective of relative deprivation, it may be argued that a household's self-perception of poverty can be influenced by the poverty in the community where that household resides. The analysis also takes this possibility into account.

There are some underlying assumptions to bear in mind. It is assumed that all aid projects are equal (i.e. their alleged effect on poverty is uniform), which may be a limitation.[10] It is also assumed that when a community benefits from a project, all the households therein do so equally (there is no obvious justification to think otherwise). Third, the effect of projects is assumed to be somewhere between immediate and within 5 years, which is plausible, especially with a subjective poverty measurement, because people tend to forget the very long run; e.g. the effect of a project undertaken 20 years ago would be zero. Finally, the definition of what a community is was not explicitly given in the survey; as several households may benefit from a given project, the inclusion of primary sampling units (ZD) as clusters is appropriate.

In terms of methodology the available data offer several options. Considering only its cross-sectional nature, a simple OLS regression may be used to express the poverty of households as a linear function of a number of variables (e.g. education, being in a rural setting, etc.) denoting these variables by a vector $X_{ji}$ as follows:

$$p_i = \alpha + \beta_j X_{ji} + e_i \tag{1-3}$$

Where $p_i$ is the poverty level of household i, $\alpha$ is an intercept, $X_{ji}$ is the vector of explanatory variables j relating to household i, and $e_i$ is the error term for household i. Adding a dummy variable for aid that would take a value of 1 (treatment group) or 0 (control group) yields an OLS equation for impact evaluation (1-4):

$$p_i = \alpha + \beta_1 \mathrm{aid}_i + \beta_j X_{ji} + e_i \tag{1-4}$$

In this case, households that benefited from aid projects (i.e. aid=1) are compared with those in the control group, keeping other factors ($X_{ij}$) constant. More interestingly, it is possible to add a continuous variable instead, with the number of aid projects household i benefited from (aid projects), which would take a value of zero if household i does not belong in the group G1a:

$$p_i = \alpha + \beta_1 \mathrm{aidprojects}_i + \beta_j X_{ji} + e_i \tag{1-5}$$

For OLS to be valid two key assumptions are: that the right-hand side variables excluded from the model (which by being excluded would fall into $e_i$) not be correlated with the explanatory variables included; and that they do not differ between program participants (aid=1) and non-participants (aid=0). These two conditions may prove unrealistic when dealing with interventions to tackle poverty. First, because as poverty is multidimensional it may be difficult to include all the control variables, which would cause omitted variable bias. And second, given the potential purposive targeting of aid projects, treatment and control households are not expected to be comparable ex-ante, so endogeneity may arise due to reverse causality (i.e. projects may influence poverty but poverty may also influence projects). One way of dealing with such endogeneity is to use an instrumental variable (IV). This technique recognizes that at least one explanatory variable, x, may be correlated with the error term, or $\mathrm{cov}(x,e) \neq 0$. The solution is to find an additional variable, or instrument z, which is not an explanatory variable

[10] The available dataset does not include data on the size of the projects.

by itself and is correlated (as highly as possible) with x but uncorrelated with the error term, so that cov(z,x) ≠ 0 and cov(z,e) = 0. An IV may reduce the problem, but at the cost of efficiency because IV estimators show higher standard errors. In some cases, the trade-off is such (e.g. if the instrument is very weak) that it may still be preferable to use OLS. The instrument chosen here is "Is anybody in the household a member of a community development association? (1: yes, 0: no)", which is assumed to be uncorrelated with the error term and is not an explanatory variable itself. If members of development associations have any influence in attracting aid projects, the proposed IV would be statistically associated with benefiting from aid, and there is no obvious reason to believe that households in which any of the family members is a member of a development association are different from regular households in terms of aid impact. This IV is statistically associated with the main key variable, i.e. having benefited from an aid project, as shown in the results section.

The panel character of the ENCVM data is particularly useful in exploring whether poverty change is related to aid projects. Using the subjective poverty measurements, we can calculate the poverty change of household i as the difference between its poverty level in 2005 and in 2000:[11]

$$pc_{i(05-00)} = p_{i(2005)} - p_{i(2000)} \tag{1-6}$$

In the new variable, a higher positive value means more poverty while higher negative values indicate less poverty. Values range from -9 (a household is self-assessed as among the wealthiest in 2005, while in 2000 it was among the poorest) to 9 (a household is self-assessed as among the poorest in 2005 while it was among the wealthiest in 2000). The frequency distribution of the variable thus calculated is shown in the annex (Figure 6).

In an ideal experimental setting, treatments would be randomly assigned (which would allow us to make causal inferences) and so would the experimental units (which would ensure the results are generalizable to the population). Thus, selection bias would be assumed to be zero because subjects in the treatment and control groups are statistically equal; if the two groups are statistically identical ex-ante but after the intervention they differ in some characteristic that can be linked to the intervention, the difference ex-post is expected to be caused by the intervention. In such a setting, the Average Treatment Effect (ATE) can be estimated as the difference-in-differences (Wooldridge 2012):

$$\text{ATE} = \left(\bar{p}_{05,\text{aid}} - \bar{p}_{05,c}\right) - \left(\bar{p}_{00,\text{aid}} - \bar{p}_{00,c}\right) \tag{1-7}$$

Where $\bar{p}$ denotes the mean poverty level, the subscripts 05 and 00 refer to years 2005 and 2000, aid refers to the group of households that benefited from aid and c is the control group(s). Equation (1-7) is valid when all other factors are expected to be similar, however. As noted, in the current setting that is not plausible owing to the purposive nature of aid projects, which means that control variables must be included. To have a clear understanding of a model specified in differences, and which includes control variables, we can re-write the model that explains the poverty level, equation (1-4), indexing it with time as:

$$p_{it} = \alpha + \beta_1 \text{aid}_{it} + \beta_j X_{jit} + e_{it} \tag{1-8}$$

Taking the same equation (1-8) one time period earlier yields:

$$p_{i(t-1)} = \alpha' + \beta'_1 \text{aid}_{i(t-1)} + \beta'_j X_{ji(t-1)} + e'_{i(t-1)} \tag{1-9}$$

[11] The subjective measure of poverty must be used, as data on objective poverty in 2000 were not available.

The parameters in equation (1-9) are indicated by an apostrophe to show that they are a sample of the same process (poverty) one period earlier. Subtracting equation (1-9) from equation (1-8) and renaming $\alpha - \alpha' = \phi$ and $e_{it} - e'_{i(t-1)} = \nu_i$, yields equation (1-10):

$$pc_{it(t-1)} = \phi + [\beta_1 aid_{it} - \beta'_1 aid_{i(t-1)}] + [\beta_j X_{jit} - \beta'_j X_{ji(t-1)}] + \nu_i \quad (1\text{-}10)$$

This equation explains the change in poverty on the change in two groups of explanatory variables: one relating to aid and the other composed by controls. With regard to the first group, taking a 5-year period (a lustrum) as the difference between t and t-1, the change in poverty is explained by having benefited from an aid project undertaken between 2000 and 2005. Regarding the control variables, there are several options:

First, if all $X_{jit} = X_{ji(t-1)}$, this would be the case of Fixed Effects (FE); $X_{ji}$ is constant over time and therefore would disappear taking first differences. Then, all the variance of the dependent variable would be accounted for by $\phi$, aid, and the error term.

Secondly, if $\beta_j = \beta'_j$ and $X_{jit} \neq X_{ji(t-1)}$, then the effect of control variables becomes $\beta_j[X_{jit} - X_{ji(t-1)}]$. In this case, the model is estimated using $\Delta X_{jit}$, or difference-in-differences.

Finally, it is possible that $\beta_j \neq \beta'_j$ and $X_{jit} \neq X_{ji(t-1)}$. The estimation requires data on $X_{ji(t-1)}$, so if variables pertaining to the true model are not available (i.e. equation is estimated only with $X_{jit}$), the information of $X_{ji(t-1)}$ will be included in $\nu_i$. This would be problematic because $X_{jit}$ is likely to be correlated with $X_{ji(t-1)}$ and therefore it would lead to endogeneity. In this research, this would be equivalent to including as control variables the values of $X_{ji}$ in 2005, effectively assuming $X_{ji(2000)} = 0$ when $X_{ji(2000)} \neq 0$.

It is not possible to determine exactly which scenario is most applicable, for that requires knowing $X_{ji(2000)}$ and $\beta'_j$. However, it is likely that in a 5-year framework a combination of the three cases is given, as in equation (1-11): some control variables are likely to change (e.g. education) and therefore first differences, $\Delta X_{ji(05-00)}$, would be adequate; other variables are more likely to remain constant, e.g. whether a household lives in a rural setting; finally, it is also possible that for some variables $X_{ki}$, the value in 2000 was zero, so it would be correct to include their value in 2005 in the model.

$$pc_{i(05-00)} = \phi + \beta_1 aid_{i(05-00)} + \beta_j \Delta X_{ji(05-00)} + \beta_k X_{ki05} + \nu_i \quad (1\text{-}11)$$

## *3. Results*

Selected statistics of interest are shown in the annex (Table 1), which includes variables already identified as being associated with poverty in Niger (INS Niger, Banque Mondiale 2006). In 2005, 62.1 percent of the country's population was poor, most lived in rural areas (only 16.8 percent of households were urban), and the mean annual expenditure per capita was 124,740 FCFA or approximately 237 USD. Regarding development projects, 82.1 percent of the population were reached by at least one between 2000 and 2005, while aid projects reached 31.7 percent of the total population. The average Nigerien household saw 2.6 development projects in its community, compared to 3.6 projects for households reached by aid. This means that aid projects complement projects from other sources; indeed, of all aid projects, only 27.8 percent were funded by aid alone, the other 72.2 percent being co-

funded.[12] Results of t-tests for a comparison of means between the G1a and (G2+G1b) groups show that households benefitting from aid tended to be rural, to have lower household expenditures per capita and more often to be objectively poor (64.9 percent vs. 60.8 percent).

Table 2 also shows that in 2005, aid-receiving households self-assessed themselves as poorer than non-aid-project households on a scale from 0 to 9 (means of 6.208 vs. 6.074). However, in 2000 they were wealthier (means of 5.19 vs. 5.295), which implies a deterioration of their economic situation over time (Poverty Change = 1.018 vs. 0.779). In terms of the change in poverty across groups, an equality of variance test shows a p-value of 0.0294 (the null hypothesis of equal variances can be rejected at 5% significance). Considering unequal variances, the difference in their means is statistically significant. Furthermore, in 2005 treatment households consider their communities to be wealthier than households who did not benefit from aid (5.814 vs 5.960). Between treatment and control groups, there are no statistically significant differences in gender of the household head and the household size. Most of the variables, however, show differences that are statistically significant. This is the case for education, where differences are large at the level of secondary education, professional/technical qualification and university (Table 3). Regarding the marital status of the household head, the most remarkable difference is that aid beneficiaries have higher rates of polygamous marriages (Table 4).

The differences identified across groups might be interpreted as evidence of poverty targeting. However, these differences relate to 2005. Incidence of aid projects and poverty levels in 2000 show correlation coefficients implying that, if anything, households that were wealthier in 2000 benefited from projects more often (Table 2). This applies to all development projects, aid projects, aid compared to no project and aid compared to other projects (Table 2). The only case in which households that were poorer in 2000 seem to have benefited more from aid is when aid was the only source of funding, which may imply that aid-only projects are more likely to target the poor (Table 2).

The distribution of aid projects' incidence is very positively skewed (Figure 7), and strong differences across the country's regions are clear (Figure 8). In terms of the number of projects, the relationship between number of aid projects and poverty change may fit a non-linear plot (Figure 9).

Table 5 in the annex shows an OLS regression of households' subjective poverty level in 2005. Explanatory variables include having benefited from at least one aid project and other controls (columns 1-4). Again, the main result is that households that are poorer in 2005 are positively associated with aid projects. Households in poorer communities and those who self-assess themselves as poorer in 2000 consider themselves poorer in 2005, which is consistent with the common perception that poverty is sticky. Education of household heads is negatively associated with poverty, although not at all levels: it starts being statistically significant with a high school degree and the coefficients rise progressively to reach the highest coefficient for those who hold a university degree. This is consistent with the extreme scarcity of human capital in Niger.[13] It is also worth noting that households in Zinder are less poor than those in Agadez. Indeed, the Zinder region has some benefits; it enjoys less harsh climatic conditions, is in an important peanut producing region and is at the crossroads of the East-West road through Niger to Chad, and North-South route from Agadez to Kano (Nigeria).

The specification in columns (5-8) compares households that benefitted from aid (G1a) with the sub-group households who saw no project at all during the period 2000-2005 (G2). In this case, aid projects do not increase or reduce households' poverty. Depending on the specification, households who were consulted about the projects to be undertaken in their community showed lower levels of poverty (columns 6-7). Other results are like those in columns (1-4), although now older household heads are poorer, and urban households do not show higher levels of poverty than rural households.

[12] Conversely, if households that benefited from aid saw fewer projects on average than the general Nigerien household, this would suggest that aid projects substitute projects from other sources.

[13] For example, in 2015 only 19.1% of all people aged 15 and above could read and write (UNESCO 2016).

A third group of interest is composed of households who benefited from development projects funded by other sources (G1b). The estimation is shown in columns (9-12) of Table 6. Remarkably, households benefiting from aid are poorer than those households who have benefited from other projects. In this instance, consulting households is not significant at all, which may suggest that the key feature is not so much what donor the project came from, but the information on the necessary interventions to carry out: projects coming from sources other than aid are national, and therefore they allegedly understand local realities better, which has been noted in the implementation of projects in Niger at the grassroots level (Rossi 2006). The geographical dimension becomes important, and households in all regions are consistently less poor than those in Agadez, a vast poor region in the Sahara Desert where only 67 of the total 1,937 aid projects were implemented.

Aid-only projects are compared to those that were co-funded in columns (13-16) of Table 6, and there are no differences between them. This suggests that regarding households' poverty in 2005, aid donors who undertake projects on their own are not more or less efficient than those co-funding.

Table 7 shows the initial model of columns (1-4), but now an instrumental variable (IV) is chosen instead of the aid project dummy. The IV is "Is anybody in the household a member of a community development association? (1: yes, 0: no)", which as noted earlier is not an explanatory variable itself and is assumed to be uncorrelated with the error term. The IV shows a correlation coefficient with having benefited from an aid project (group G1a) vs the opposite (G2+G1b) of 0.14, significant at 99 percent confidence. The first-stage estimation in columns (21-24) confirms that the relationship is robust to the inclusion of control variables (Table 7). The 2SLS results show that the association between aid and poverty level is insignificant (columns 17-20), with a p-value of 0.539. To compare the IV and OLS estimates, results of the Hausman test are shown (Table 8). The null hypothesis that the difference in coefficients (between IV and OLS estimators) is not systematic cannot be rejected, therefore OLS is preferred because it is more efficient.

The relationship between poverty level and the number of aid projects, instead of the discrete approach, is also estimated (columns 25-28 in Table 9). Visibly, the relationship is non-linear: the number of aid projects is associated with higher poverty levels but at a decreasing return. The other results are broadly similar: education is negatively associated with poverty, and poorer households in 2000, those in urban areas and those in poorer communities consider themselves to be poorer. Columns (29-32) show that regarding aid projects, aid-only projects are not associated with poverty in 2005 compared with co-funded projects (Table 9).

Next, change in poverty is regressed under the discrete approach on having benefited from aid (G1a vs G2+G1b), control variables in change, and other control variables that are less susceptible to change in 5 years, which are progressively added in the 2005 level (Table 10). Benefiting from aid is associated with an increase in poverty (columns 33-36). Considering change in explanatory variables, those households who state that access to justice has improved are significantly less poor than those who say it has deteriorated (the reference group), although access to water also statistically significant—is not required to have changed. Households who live in poorer communities and urban areas have become poorer, while more education in 2005 is a factor strongly associated with greater reductions in poverty. The coefficient of households' poverty in 2000 shows that the poorer a household was in the past, the less its poverty has increased, i.e. given a very bad baseline, things do not get much worse.

Disaggregating the main control group, we can see that with regard to the second control group (no project at all, G2), there is no association between aid and poverty change (columns 37-40). Again, this means that the overall association between aid and poverty change must be driven by the comparison between aid projects and other funders' projects. Results for other control variables are similar, although specific characteristics of household heads denote the possibility of social exclusion (e.g. being older or widowed divorced or separated).

Considering the third control group (G1b), households who benefited from aid were left relatively worse off than those who benefited from a project from a different source (columns 41-44 in Table 11). Benefiting from projects that are funded by aid only (vs co-funding) shows no significant statistical relationship to poverty change (columns 45-48).

Finally, poverty change is regressed on the number of aid projects and explanatory variables in differences and level (Table 12). Once again, the number of aid projects suggests a non-linear relationship with a change in poverty (columns 49-52). And again, households who consider access to justice has improved see negative increases in poverty. The other results are similar to the other models and specifications (e.g. household's poverty in 2000, community's poverty, etc.). As in previous models, relative to co-funding, aid-funding alone is not associated with improvements or deteriorations in poverty (columns 53-56).

Fitting the four models estimated with poverty to the number of aid projects (Table 9 to Table 12) allows for a graphic interpretation of the results (Figure 10): considering all aid projects, poverty stays stable (and if anything increases slightly) up to around 10 projects. At that level, it starts decreasing as households benefit from more aid initiatives. The 'breakeven' is reached at about 18 projects, i.e. at that moment households self-assess as having improved relative to their initial situation. Interestingly, however, the pattern of the graphs is positively-sloped when aid-only projects are considered. Although the slope is very close to zero, this may suggest that collaborating with national partners plays a critical role, i.e. it is not guaranteed that an aid donor adding more projects on its own will ever reach the threshold at which poverty starts to decline. The residuals of the models estimated with number of projects are normally distributed around zero (Figure 11).

## *4. Conclusion*

Given the evidence presented, the null hypothesis that aid projects are associated with reductions in households' poverty, is rejected. If anything, the findings suggest the opposite. In 2005, households who benefited from aid between 2000 and 2005 are poorer. This is not due to the purposive poverty targeting of aid, but because households who benefited from aid have become poorer. Disaggregating the control group in two sub-groups is vital to shed light on this: relative to households who received no project, aid projects are not significantly associated with changes in households' poverty. The overall result is driven by the second group, which means that households benefiting from aid are poorer relative to households who benefit from other donors' projects.

What could explain such a result? Projects that are funded by aid alone are not associated with improvements or deteriorations in poverty relative to co-funded projects. However, the pattern of poverty reduction as a function of the number of aid projects becomes slightly positively-sloped when aid-only projects are considered, which suggests that collaborating with national partners may enhance the impact of aid projects. Given the significance of consulting households in some cases, the key may lie in information and knowledge about local conditions: projects coming from sources other than aid are national, and therefore understand local realities better, which is in line with the (scarce) descriptions of Niger's aid interventions (Rossi 2006).

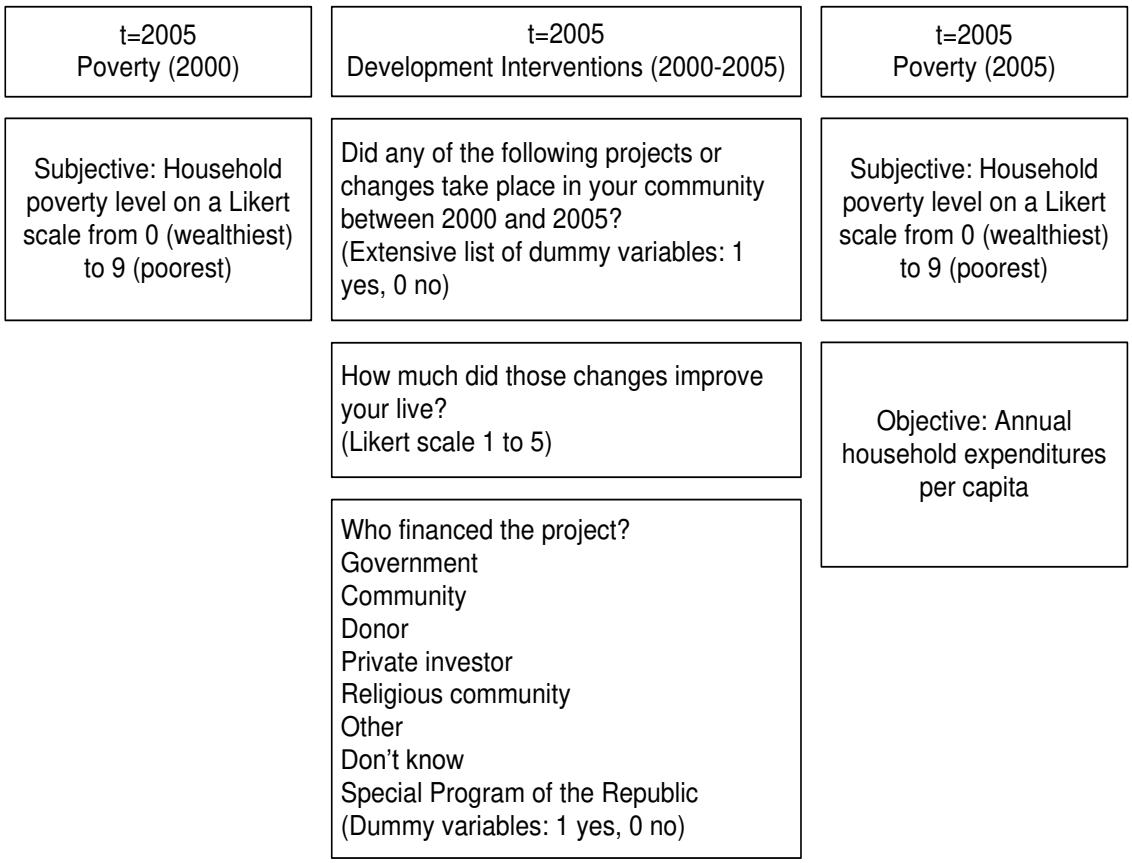
To reduce poverty (or at least its self-perception), it is necessary to go beyond the threshold at which cross-sector synergies appear. Keeping the quality of projects constant, that threshold is estimated at 10 projects; 18 for households to be better off than 5 years earlier. Such a high number is insightful: poverty is sticky and multidimensional, as it can be determined by such factors as governance, family background, distance to public services or trade corridors, education or bad luck. Given this complexity, aid projects must reach a critical mass to create synergies across different dimensions and reduce

poverty: for someone in a rural context such as Niger's *brousse*, just a few projects such as fixing the nearby school, a new well or a veterinary service will not be enough; not when that person still has so many other challenges, e.g. has to feed a family of 10, cannot find a qualified job due to illiteracy, is often sick, has no access to financial services, no access to fertile land, etc.

The findings support the idea that there is a minimum number of home-grown interventions required to achieve the economies of scale that lead to poverty reduction. For aid donors, this may arguably entail a different role, e.g. more in line with budget support than with the traditional aid parallel structures for project implementation.

## *5. Annexes*

Figure 2. Key questions of interest in the ENCVM 2005[14]




[14] t denotes when the questions were asked, while the year to which the information relates is in parenthesis.

Figure 3. Frequency distribution of subjective poverty in 2000, with normal density plot

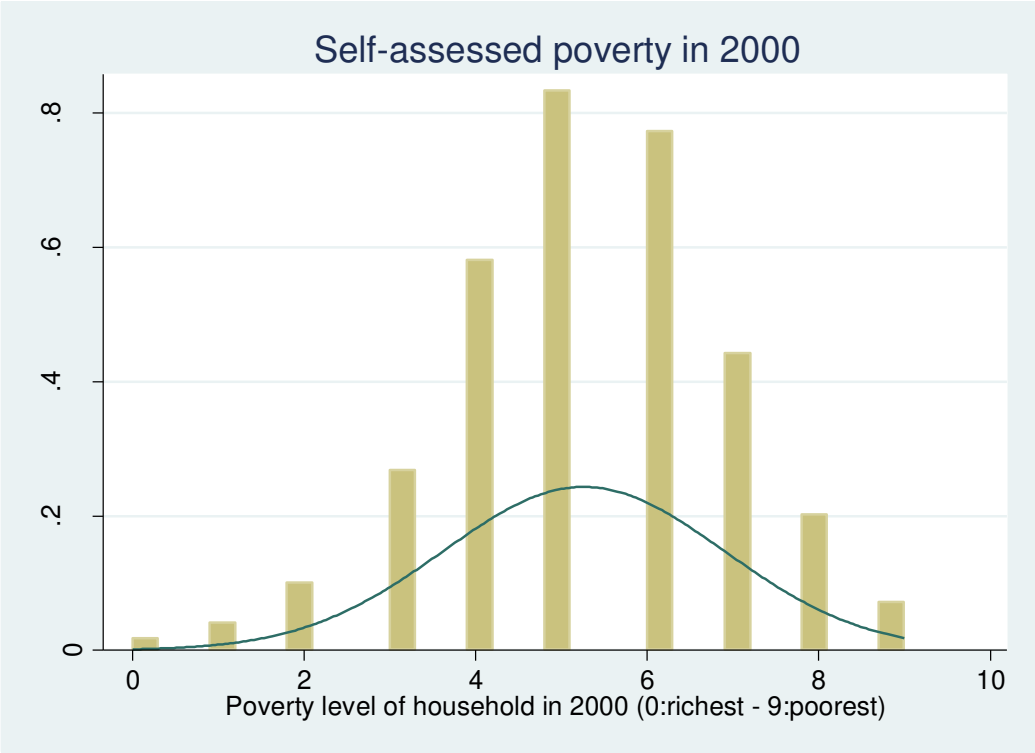



Figure 4. Frequency distribution of subjective poverty in 2005, with normal density plot

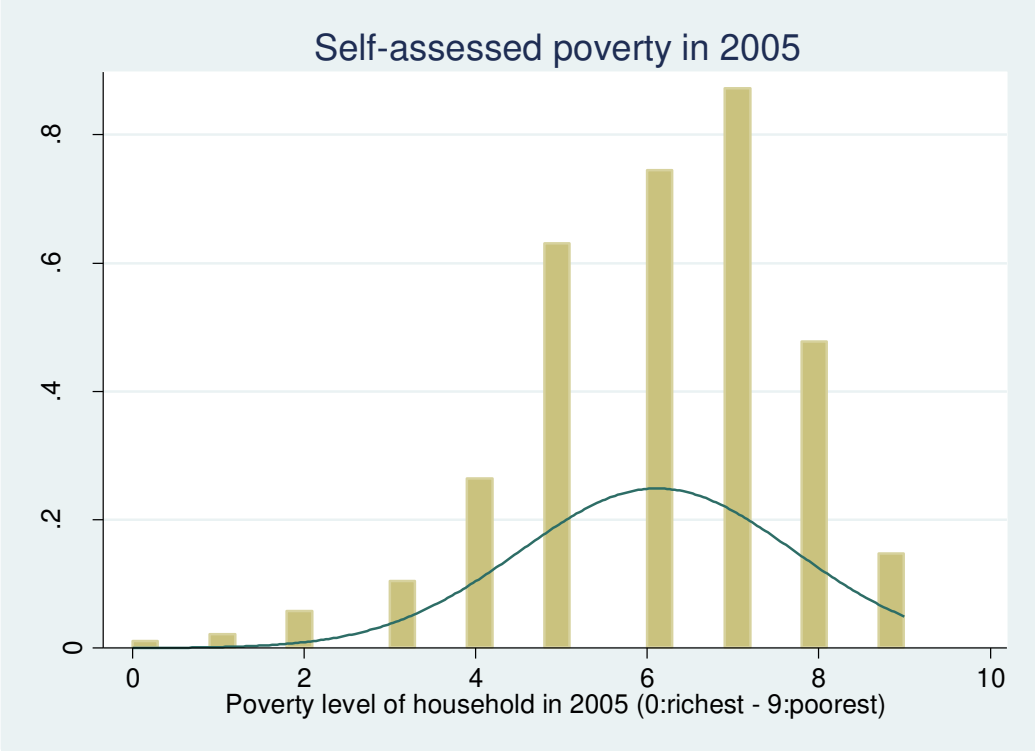


Figure 5. Fitted linear relationship between self-assessed poverty and expenditures per capita (FCFA)

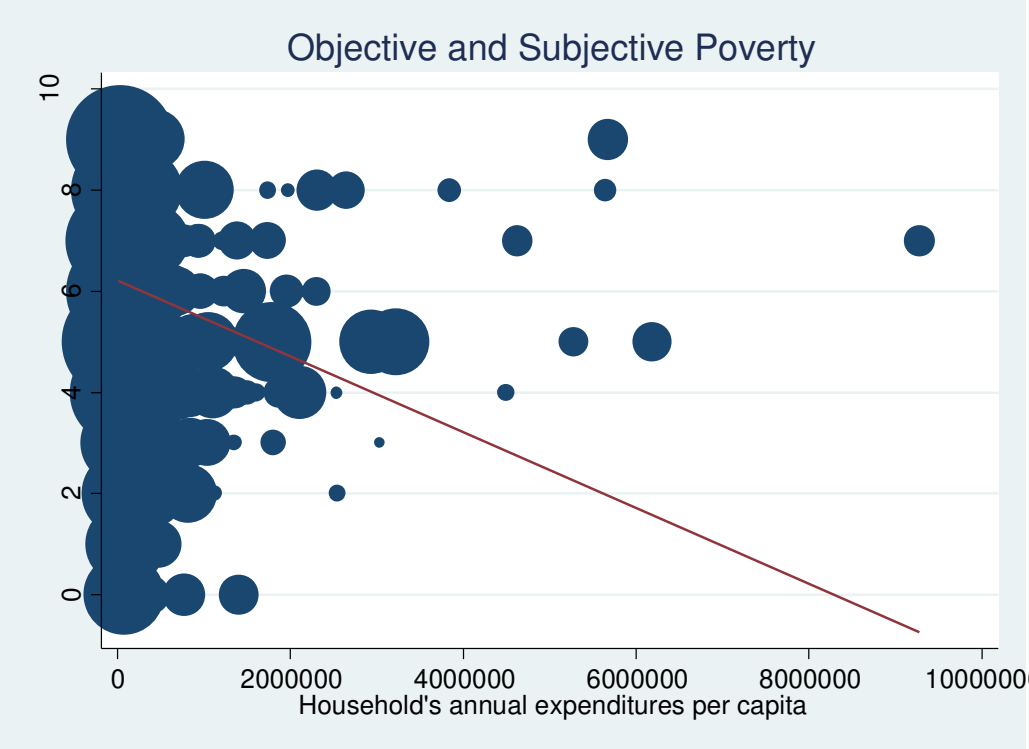



Figure 6. Frequency distribution of "Poverty change 2005–2000" with normal density plot

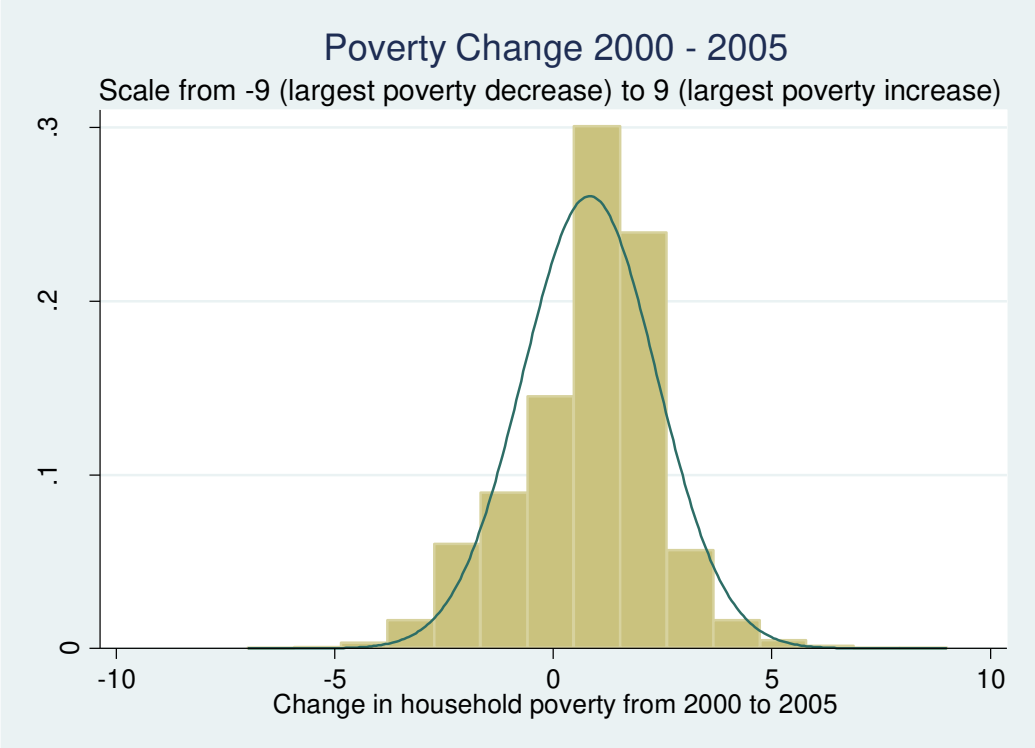


Table 1. Summary statistics of key variables for all households (a), those benefited from a development project (b) and those who did not (c)[15]

| | All households ($G_0$) | | | | | Aid-project households= Yes ($G_{1a}$) | | | | | Aid-project households=No ($G_2$+$G_{1b}$) | | | | | t-test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | mean | s.d. | min | max | n | mean | s.d. | min | max | n | mean | s.d. | min | max | p-value[16] |
| HH's poverty level in 2000 (0: wealthiest to 9:poorest) | 6,679 | 5.262 | 1.64 | 0 | 9 | 1,936 | 5.19 | 1.562 | 0 | 9 | 4743 | 5.295 | 1.674 | 0.0 | 9.0 | 0.051 |
| HH poverty level in 2005 (0: wealthiest to 9:poorest) | 6,689 | 6.116 | 1.603 | 0 | 9 | 1,937 | 6.208 | 1.479 | 0 | 9 | 4752 | 6.074 | 1.656 | 0.0 | 9.0 | 0.009 |
| Poverty change 2000-2005 | 6,679 | 0.854 | 1.535 | -7 | 9 | 1,936 | 1.018 | 1.515 | -6 | 8 | 4,743 | 0.779 | 1.534 | -7.0 | 9.0 | 0.000 |
| HH is objectively poor in 2005 (1:yes, 0:no) | 6,690 | 0.621 | 0.485 | 0 | 1 | 1,937 | 0.649 | 0.477 | 0 | 1 | 4753 | 0.608 | 0.488 | 0.0 | 1.0 | 0.007 |
| Community's poverty level (0: wealthiest to 9:poorest) | 6,678 | 5.914 | 1.616 | 0 | 9 | 1,935 | 5.814 | 1.515 | 0 | 9 | 4743 | 5.960 | 1.658 | 0.0 | 9.0 | 0.006 |
| Urban (1:yes, 0:no) | 6,690 | 0.168 | 0.374 | 0 | 1 | 1,937 | 0.118 | 0.322 | 0 | 1 | 4753 | 0.191 | 0.393 | 0.0 | 1.0 | 0.000 |
| HH head female (1:yes, 0:no) | 6,690 | 0.046 | 0.209 | 0 | 1 | 1,937 | 0.042 | 0.2 | 0 | 1 | 4753 | 0.048 | 0.213 | 0.0 | 1.0 | 0.269 |
| HH head age | 6,690 | 46.604 | 14.194 | 15 | 99 | 1,937 | 45.765 | 13.726 | 17 | 99 | 4753 | 46.993 | 14.390 | 15.0 | 99.0 | 0.008 |
| HH Size | 6,690 | 8.389 | 4.457 | 1.0 | 31.0 | 1937 | 8.307 | 4.130 | 1.0 | 28.0 | 4753 | 8.427 | 4.600 | 1.0 | 31.0 | 0.514 |
| HH total annual expenditure per capita (thousand FCFA) | 6,690 | 124.7 | 207.7 | 6.9 | 9,277.6 | 1,937 | 112.2 | 200.4 | 8.6 | 6,189.3 | 4753 | 130.5 | 210.8 | 6.9 | 9,277.6 | 0.000 |
| Benefited from at least a project during 2000-2005 (1:yes, 0:no) | 6,690 | 0.821 | 0.383 | 0 | 1 | 1,937 | 1 | 0 | 1 | 1 | 4753 | 0.738 | 0.440 | 0.0 | 1.0 | 0.000 |
| Benefited from an aid project during 2000-2005 (1:yes, 0:no) | 6,690 | 0.317 | 0.465 | 0 | 1 | 1,937 | 1 | 0 | 1 | 1 | 4753 | 0.000 | 0.000 | 0.0 | 0.0 | 0.000 |
| No. of projects HH benefited during 2000-2005 | 6,690 | 2.565 | 2.498 | 0 | 30 | 1,937 | 3.608 | 2.319 | 1 | 29 | 4753 | 2.081 | 2.430 | 0 | 30 | 0.000 |

Table 2. Correlation coefficients between household poverty indicators and benefiting from projects

| | Dummy: Development Project (1:yes, 0:no) | Dummy: Aid project (1:yes, 0:no) | Dummy: Aid project (1) vs No project (0) | Dummy: Aid project (1) vs Project from others (0) | Dummy: Aid-only project (1) vs Aid project (0) |
|---|---|---|---|---|---|
| Household poverty level, 2000 | -0.0436*** | -0.0462*** | -0.08*** | -0.0379*** | 0.0457** |
| Obs. | 6,679 | 6,679 | 3,248 | 5,367 | 1,936 |
| Household poverty level, 2005 | -0.0559*** | 0.0079 | -0.0506*** | 0.0301** | 0.0228 |
| Obs. | 6,689 | 6,689 | 3,249 | 5,377 | 1,937 |
| Dummy: Objectively poor, 2005 (1:yes, 0:no) | 0.0314** | 0.0459*** | 0.0664*** | 0.0422*** | 0.1415*** |
| Obs. | 6,690 | 6,690 | 3,250 | 5,377 | 1,937 |
| Community's poverty level, 2005 | -0.0620*** | -0.0440*** | -0.0992*** | -0.0287** | -0.0092 |
| Obs. | 6678 | 6678 | 3247 | 5366 | 1935 |

* significant at 5% level; ** significant at 1% level

[15] All data refer to 2005, unless otherwise stated in a specific variable

[16] Test of equality of means between groups ($G_{1a}$) and ($G_2$+$G_{1b}$ )

Table 3. Summary statistics of the population: education of the household head in 2005

| | All households ($G_0$) | | Aid-project households= Yes ($G_{1a}$) | | Aid-project households=No ($G_2+G_{1b}$) | |
|---|---|---|---|---|---|---|
| Level | Freq. | Percent | Freq. | Percent | Freq. | Percent |
| None | 3,962 | 59.22 | 788 | 60.02 | 1,147 | 59.22 |
| Islamic school | 1,307 | 19.54 | 272 | 20.72 | 391 | 20.19 |
| Read & Write | 123 | 1.84 | 15 | 1.14 | 55 | 2.84 |
| Primary | 620 | 9.27 | 101 | 7.69 | 196 | 10.12 |
| Secondary | 339 | 5.07 | 62 | 4.72 | 84 | 4.34 |
| Professional/Technical | 220 | 3.29 | 46 | 3.5 | 45 | 2.32 |
| University | 119 | 1.78 | 29 | 2.21 | 19 | 0.98 |
| Total | 6,690 | 100 | 1,313 | 100 | 1,937 | 100 |

Pearson Chi square for groups (b) and (c) = 37.9299 Pr = 0.000

Table 4. Summary statistics of the population: marital status of household head in 2005

| | All households ($G_0$) | | Aid-project households= Yes ($G_{1a}$) | | Aid-project households=No ($G_2+G_{1b}$) | |
|---|---|---|---|---|---|---|
| Status | Freq. | Percent | Freq. | Percent | Freq. | Percent |
| Single | 117 | 1.75 | 29 | 1.5 | 88 | 1.85 |
| Married monogamous | 4,525 | 67.64 | 1,284 | 66.29 | 3,241 | 68.19 |
| Married polygamous | 1,420 | 21.23 | 456 | 23.54 | 964 | 20.28 |
| Widow(er)/Divorced/Separated | 628 | 9.39 | 168 | 8.67 | 460 | 9.68 |
| Total | 6,690 | 100 | 1,937 | 100 | 4,753 | 100 |

Pearson Chi square for groups (b) and (c) = 10.0918 Pr = 0.018

Figure 7. Average number of aid projects households benefited from

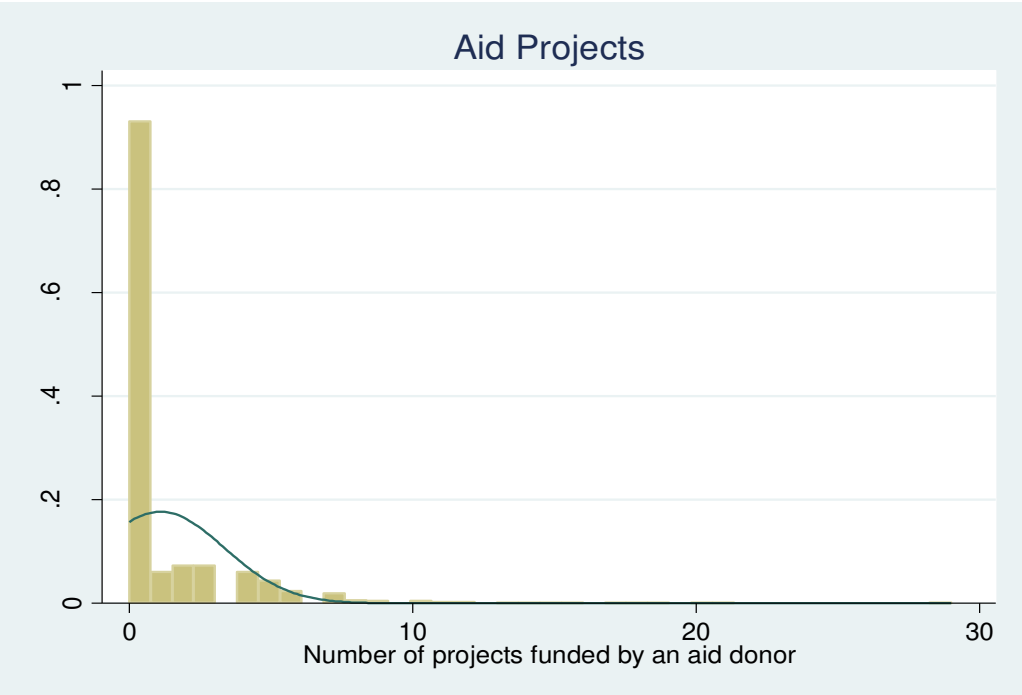


Figure 8. Aid projects by region

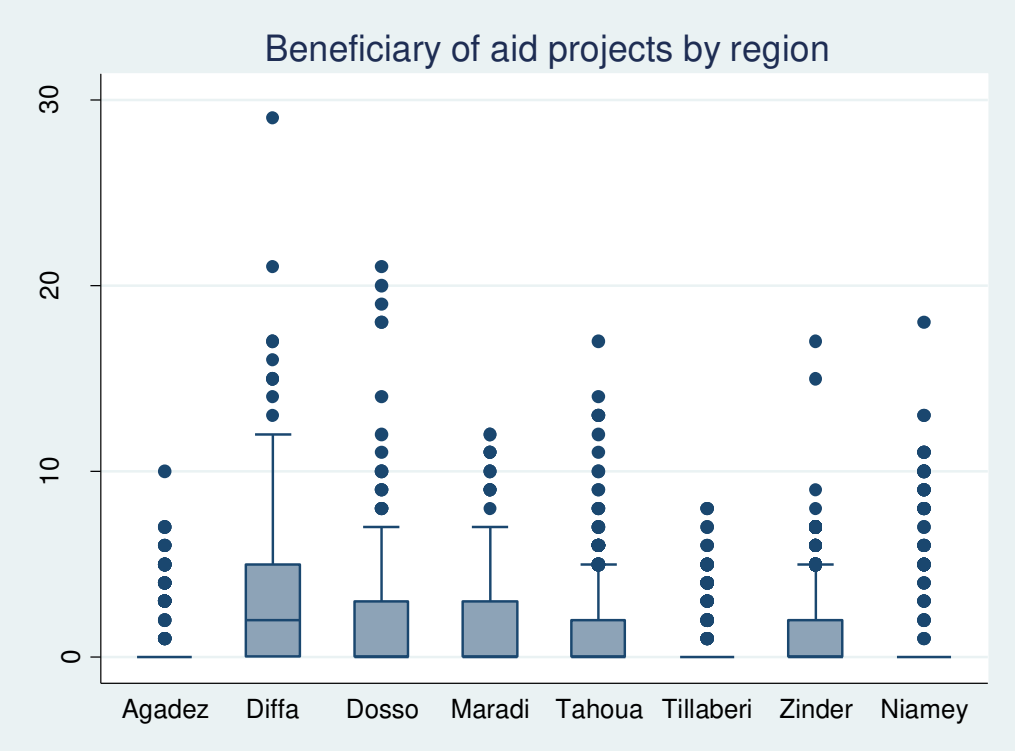



Figure 9. Relationship between the number of aid projects and poverty change

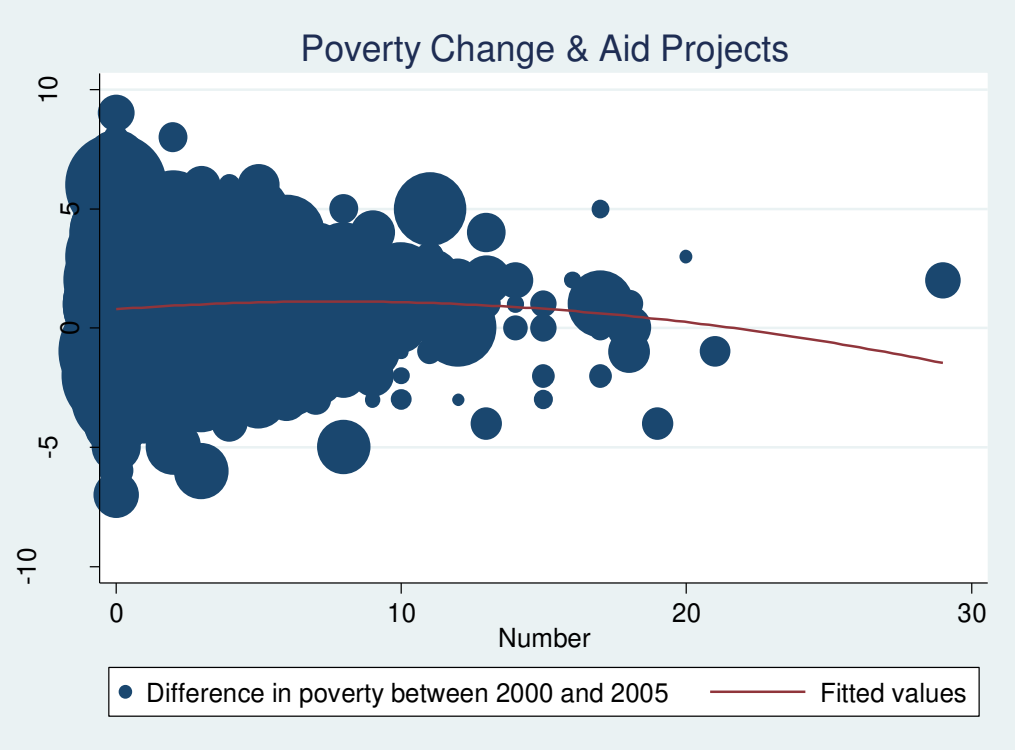


Table 5. Poverty level and benefiting from aid projects

| | Poverty level of household in 2005 (0:richest - 9:poorest) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dummy: Project funded by aid ($G_{1a}$) vs No aid ($G_2$+$G_{1b}$) | 0.147 | 0.246 | 0.25 | 0.251 | | | | |
| | [0.081] | [0.055]** | [0.054]** | [0.055]** | | | | |
| Dummy: Project from aid ($G_{1a}$) vs No project at all ($G_2$) | | | | | -0.047 | 0.136 | 0.137 | 0.115 |
| | | | | | [0.112] | [0.075] | [0.075] | [0.080] |
| Household consulted about project to do (1:yes, 0:no) | -0.081 | -0.086 | -0.095 | -0.073 | -0.156 | -0.165 | -0.188 | -0.109 |
| | [0.069] | [0.047] | [0.047]* | [0.051] | [0.095] | [0.067]* | [0.067]** | [0.065] |
| Household size | | -0.01 | -0.012 | -0.012 | | -0.009 | -0.016 | -0.008 |
| | | [0.006] | [0.006]* | [0.006] | | [0.007] | [0.008]* | [0.008] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | 0.338 | 0.338 | 0.336 | | 0.312 | 0.31 | 0.291 |
| | | [0.022]** | [0.022]** | [0.023]** | | [0.030]** | [0.030]** | [0.030]** |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | 0.42 | 0.412 | 0.413 | | 0.418 | 0.416 | 0.425 |
| | | [0.018]** | [0.018]** | [0.019]** | | [0.025]** | [0.024]** | [0.025]** |
| Urban household (1:yes, 0:no) | | 0.089 | 0.241 | 0.223 | | -0.021 | 0.068 | 0.081 |
| | | [0.057] | [0.056]** | [0.064]** | | [0.085] | [0.084] | [0.091] |
| Age of the household head | | | 0.002 | 0.002 | | | 0.006 | 0.005 |
| | | | [0.002] | [0.002] | | | [0.002]** | [0.002]* |
| Sex of household head is female (1:yes, 0:no) | | | -0.038 | -0.044 | | | -0.03 | -0.07 |
| | | | [0.144] | [0.141] | | | [0.180] | [0.171] |
| Education = Islamic | | | 0 | 0 | | | -0.038 | -0.01 |
| | | | [0.053] | [0.053] | | | [0.074] | [0.072] |
| Education = Read & Write | | | -0.023 | -0.026 | | | 0.156 | 0.209 |
| | | | [0.149] | [0.150] | | | [0.167] | [0.166] |
| Education = Primary | | | -0.069 | -0.074 | | | 0.012 | 0.046 |
| | | | [0.074] | [0.075] | | | [0.095] | [0.096] |
| Education = Secondary | | | -0.525 | -0.532 | | | -0.528 | -0.49 |
| | | | [0.107]** | [0.106]** | | | [0.138]** | [0.138]** |
| Education = Professional / Technical | | | -1.005 | -0.994 | | | -1.124 | -1.075 |
| | | | [0.127]** | [0.127]** | | | [0.177]** | [0.174]** |
| Education = University | | | -1.247 | -1.229 | | | -1.239 | -1.139 |
| | | | [0.140]** | [0.139]** | | | [0.331]** | [0.332]** |
| Marital status = Married monogamous | | | -0.039 | -0.033 | | | -0.024 | -0.007 |
| | | | [0.151] | [0.151] | | | [0.186] | [0.193] |
| Marital status = Married polygamous | | | -0.037 | -0.033 | | | 0.037 | 0.031 |
| | | | [0.159] | [0.160] | | | [0.205] | [0.213] |
| Marital status = Widow(er)/Divorced/Separated | | | 0.21 | 0.225 | | | 0.237 | 0.302 |
| | | | [0.201] | [0.199] | | | [0.243] | [0.244] |
| Region = Diffa | | | | -0.172 | | | | -0.014 |
| | | | | [0.141] | | | | [0.193] |
| Region = Dosso | | | | -0.189 | | | | -0.105 |
| | | | | [0.121] | | | | [0.163] |
| Region = Maradi | | | | -0.183 | | | | -0.032 |
| | | | | [0.127] | | | | [0.180] |
| Region = Tahoua | | | | -0.121 | | | | 0.37 |
| | | | | [0.127] | | | | [0.161]* |
| Region = Tillaberi | | | | -0.208 | | | | 0.118 |
| | | | | [0.121] | | | | [0.181] |
| Region = Zinder | | | | -0.264 | | | | -0.085 |
| | | | | [0.113]* | | | | [0.160] |
| Region = Niamey | | | | -0.162 | | | | 0.003 |
| | | | | [0.120] | | | | [0.169] |
| Observations | 6689 | 6667 | 6667 | 6667 | 3249 | 3245 | 3245 | 3245 |
| R-squared | 0.002 | 0.408 | 0.425 | 0.426 | 0.003 | 0.382 | 0.404 | 0.413 |

Robust standard errors in brackets

* significant at 5% level; ** significant at 1% level

Table 6. Poverty level and benefiting from aid projects

| | Poverty level of household in 2005 (0:richest - 9:poorest) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| Dummy: Aid project ($G_{1a}$) vs Project from others ($G_{1b}$) | 0.208 | 0.28 | 0.285 | 0.28 | | | | |
| | [0.085]* | [0.057]** | [0.056]** | [0.057]** | | | | |
| Project funded only by aid (1:yes, 0:no) | | | | | 0.081 | 0.035 | 0.003 | -0.012 |
| | | | | | [0.127] | [0.098] | [0.096] | [0.094] |
| Household consulted about project to do (1:yes, 0:no) | 0.013 | -0.032 | -0.04 | -0.018 | 0.018 | -0.069 | -0.09 | -0.02 |
| | [0.075] | [0.052] | [0.051] | [0.056] | [0.111] | [0.087] | [0.085] | [0.083] |
| Household size | | -0.01 | -0.01 | -0.012 | | -0.011 | -0.013 | -0.007 |
| | | [0.006] | [0.007] | [0.007] | | [0.009] | [0.009] | [0.010] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | 0.349 | 0.351 | 0.352 | | 0.333 | 0.333 | 0.322 |
| | | [0.025]** | [0.025]** | [0.026]** | | [0.037]** | [0.038]** | [0.038]** |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | 0.401 | 0.393 | 0.39 | | 0.364 | 0.366 | 0.374 |
| | | [0.018]** | [0.018]** | [0.019]** | | [0.030]** | [0.030]** | [0.032]** |
| Urban household (1:yes, 0:no) | | 0.15 | 0.308 | 0.287 | | 0.09 | 0.156 | 0.173 |
| | | [0.061]* | [0.059]** | [0.067]** | | [0.106] | [0.098] | [0.101] |
| Age of the household head | | | 0.002 | 0.002 | | | 0.007 | 0.007 |
| | | | [0.002] | [0.002] | | | [0.003]* | [0.003]* |
| Sex of household head is female (1:yes, 0:no) | | | -0.127 | -0.123 | | | -0.41 | -0.399 |
| | | | [0.166] | [0.165] | | | [0.208]* | [0.197]* |
| Education = Islamic | | | -0.011 | -0.015 | | | -0.072 | -0.049 |
| | | | [0.060] | [0.060] | | | [0.106] | [0.102] |
| Education = Read & Write | | | -0.1 | -0.118 | | | 0.081 | 0.122 |
| | | | [0.163] | [0.163] | | | [0.197] | [0.193] |
| Education = Primary | | | -0.045 | -0.054 | | | 0.089 | 0.125 |
| | | | [0.077] | [0.078] | | | [0.112] | [0.110] |
| Education = Secondary | | | -0.595 | -0.612 | | | -0.7 | -0.665 |
| | | | [0.121]** | [0.118]** | | | [0.181]** | [0.183]** |
| Education = Professional / Technical | | | -1.029 | -1.011 | | | -1.258 | -1.195 |
| | | | [0.146]** | [0.146]** | | | [0.252]** | [0.240]** |
| Education = University | | | -1.299 | -1.275 | | | -1.447 | -1.319 |
| | | | [0.156]** | [0.149]** | | | [0.531]** | [0.509]* |
| Marital status = Married monogamous | | | 0.011 | 0.03 | | | 0.063 | 0.073 |
| | | | [0.167] | [0.166] | | | [0.227] | [0.228] |
| Marital status = Married polygamous | | | -0.019 | -0.001 | | | 0.076 | 0.054 |
| | | | [0.173] | [0.172] | | | [0.240] | [0.239] |
| Marital status = Widow(er)/Divorced/Separated | | | 0.368 | 0.387 | | | 0.723 | 0.733 |
| | | | [0.232] | [0.228] | | | [0.286]* | [0.283]* |
| Region = Diffa | | | | -0.346 | | | | -0.252 |
| | | | | [0.142]* | | | | [0.205] |
| Region = Dosso | | | | -0.284 | | | | -0.206 |
| | | | | [0.109]** | | | | [0.156] |
| Region = Maradi | | | | -0.313 | | | | -0.184 |
| | | | | [0.114]** | | | | [0.164] |
| Region = Tahoua | | | | -0.301 | | | | 0.157 |
| | | | | [0.119]* | | | | [0.155] |
| Region = Tillaberi | | | | -0.404 | | | | -0.318 |
| | | | | [0.110]** | | | | [0.177] |
| Region = Zinder | | | | -0.465 | | | | -0.333 |
| | | | | [0.101]** | | | | [0.155]* |
| Region = Niamey | | | | -0.316 | | | | -0.303 |
| | | | | [0.111]** | | | | [0.206] |
| Observations | 5377 | 5356 | 5356 | 5356 | 1937 | 1934 | 1934 | 1934 |
| R-squared | 0.004 | 0.407 | 0.425 | 0.428 | 0.001 | 0.358 | 0.389 | 0.4 |

Robust standard errors in brackets

* significant at 5% level; ** significant at 1% level

Table 7. Relationship between poverty level and aid with Instrumental Variable

| | 2SLS: Poverty level of household in 2005 | | | | First Stage for Aid project dummy (1:yes, 0:no) | | | |
|---|---|---|---|---|---|---|---|---|
| | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) |
| Project funded by aid (1:yes, 0:no) | -0.478 | -0.336 | -0.241 | -0.471 | | | | |
| | [0.706] | [0.525] | [0.528] | [0.767] | | | | |
| IV: Member in development association (1:yes, 0:no) | | | | | 0.154*** | 0.154*** | 0.148*** | 0.106*** |
| | | | | | [0.039] | [0.038] | [0.038] | [0.035] |
| Household consulted about project (1:yes, 0:no) | 0.007 | -0.011 | -0.034 | -0.008 | 0.123*** | 0.115*** | 0.109*** | 0.080*** |
| | [0.104] | [0.076] | [0.074] | [0.078] | [0.024] | [0.026] | [0.026] | [0.026] |
| Household size | | -0.011 | -0.014 | -0.013 | | -0.004 | -0.004 | -0.002 |
| | | [0.006] | [0.006]* | [0.007] | | [0.002] | [0.003] | [0.003] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | 0.331 | 0.333 | 0.335 | | -0.012* | -0.011 | -0.002 |
| | | [0.023]** | [0.023]** | [0.024]** | | [0.007] | [0.007] | [0.006] |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | 0.417 | 0.411 | 0.412 | | -0.005 | -0.004 | -0.001 |
| | | [0.019]** | [0.018]** | [0.019]** | | [0.007] | [0.007] | [0.005] |
| Urban household (1:yes, 0:no) | | 0.049 | 0.203 | 0.215 | | -0.057 | -0.063 | -0.002 |
| | | [0.076] | [0.076]** | [0.084]* | | [0.044] | [0.047] | [0.056] |
| Age of the household head | | | 0.002 | 0.002 | | | -0.001 | 0.000 |
| | | | [0.002] | [0.002] | | | [0.001] | [0.001] |
| Sex of household head is female (1:yes, 0:no) | | | -0.008 | 0.017 | | | 0.055 | 0.080* |
| | | | [0.151] | [0.162] | | | [0.045] | [0.042] |
| Education = Islamic | | | 0.007 | -0.001 | | | 0.009 | -0.004 |
| | | | [0.058] | [0.058] | | | [0.025] | [0.025] |
| Education = Read & Write | | | 0.077 | 0.109 | | | 0.190*** | 0.178*** |
| | | | [0.170] | [0.187] | | | [0.063] | [0.056] |
| Education = Primary | | | -0.031 | -0.026 | | | 0.067** | 0.060* |
| | | | [0.092] | [0.100] | | | [0.034] | [0.031] |
| Education = Secondary | | | -0.502 | -0.482 | | | 0.043 | 0.066* |
| | | | [0.113]** | [0.124]** | | | [0.036] | [0.035] |
| Education = Professional / Technical | | | -0.989 | -0.964 | | | 0.020 | 0.031 |
| | | | [0.131]** | [0.135]** | | | [0.054] | [0.050] |
| Education = University | | | -1.265 | -1.217 | | | -0.043 | 0.011 |
| | | | [0.136]** | [0.137]** | | | [0.057] | [0.051] |
| Marital status = Married monogamous | | | -0.045 | -0.085 | | | -0.019 | -0.076 |
| | | | [0.154] | [0.164] | | | [0.068] | [0.064] |
| Marital status = Married polygamous | | | -0.025 | -0.077 | | | 0.017 | -0.065 |
| | | | [0.164] | [0.174] | | | [0.073] | [0.069] |
| Marital status = Widow(er)/Divorced/Separated | | | 0.193 | 0.139 | | | -0.038 | -0.119** |
| | | | [0.205] | [0.219] | | | [0.075] | [0.070] |
| Region = Diffa | | | | 0.141 | | | | 0.422*** |
| | | | | [0.378] | | | | [0.072] |
| Region = Dosso | | | | -0.04 | | | | 0.190*** |
| | | | | [0.219] | | | | [0.073] |
| Region = Maradi | | | | 0.035 | | | | 0.293*** |
| | | | | [0.265] | | | | [0.064] |
| Region = Tahoua | | | | -0.007 | | | | 0.152*** |
| | | | | [0.184] | | | | [0.058] |
| Region = Tillaberi | | | | -0.281 | | | | -0.098** |
| | | | | [0.152] | | | | [0.034] |
| Region = Zinder | | | | -0.122 | | | | 0.193*** |
| | | | | [0.208] | | | | [0.065] |
| Region = Niamey | | | | -0.213 | | | | -0.071 |
| | | | | [0.149] | | | | [0.048] |
| Observations | 6689 | 6667 | 6667 | 6667 | 6689 | 6667 | 6667 | 6667 |

Robust standard errors in brackets

* significant at 5% level; ** significant at 1% level

Table 8. Results of Hausman test comparing IV and OLS estimates

| | ---- Coefficients ---- | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt(diag(V_b-V_B)) |
| | IV | OLS | Difference | S.E. |
| Project funded by aid (1:yes, 0:no) | -0.4708408 | 0.2508839 | -0.7217247 | 0.7421739 |
| Household consulted about project to do (1:yes, 0:no) | -0.0078225 | -0.0727967 | 0.0649743 | 0.0564864 |
| Poverty level of household in 2000 (0:richest - 9:poorest) | 0.4116139 | 0.4128494 | -0.0012355 | 0.0023242 |
| Poverty level of community in 2005 (0:richest - 9:poorest) | 0.3347056 | 0.3361425 | -0.0014369 | . |
| Urban household (1:yes, 0:no) | 0.2154930 | 0.2225853 | -0.0070923 | 0.0501034 |
| Household size | -0.0127743 | -0.0115105 | -0.0012638 | 0.0023784 |
| Age of the household head | 0.0023445 | 0.0021983 | 0.0001462 | 0.0002805 |
| Sex of household head is female (1:yes, 0:no) | 0.0174895 | -0.0437429 | 0.0612324 | 0.0687104 |
| Marital status = Married monogamous | -0.0848870 | -0.0326685 | -0.0522185 | 0.0512015 |
| Marital status = Married polygamous | -0.0767714 | -0.0327229 | -0.0440486 | 0.0535083 |
| Marital status = Widow(er)/Divorced/Separated | 0.1390868 | 0.2249812 | -0.0858944 | 0.0757918 |
| Education = Islamic | -0.0010834 | 0.0003501 | -0.0014335 | 0.0201499 |
| Education = Read & Write | 0.1091344 | -0.0255747 | 0.1347091 | 0.1017301 |
| Education = Primary | -0.0260445 | -0.0744728 | 0.0484284 | 0.0617758 |
| Education = Secondary | -0.4824491 | -0.5324940 | 0.0500449 | 0.0577055 |
| Education = Professional / Technical | -0.9643343 | -0.9937054 | 0.029371 | 0.0337989 |
| Education = University | -1.2170770 | -1.2287490 | 0.0116718 | . |
| Region = Diffa | 0.1408606 | -0.1723101 | 0.3131707 | 0.3384032 |
| Region = Dosso | -0.0401198 | -0.1889246 | 0.1488048 | 0.1747443 |
| Region = Maradi | 0.0345706 | -0.1832695 | 0.2178401 | 0.2232767 |
| Region = Tahoua | -0.0069322 | -0.1205646 | 0.1136324 | 0.124782 |
| Region = Tillaberi | -0.2805212 | -0.2083627 | -0.0721585 | 0.0845447 |
| Region = Zinder | -0.1215156 | -0.2640101 | 0.1424945 | 0.1666759 |
| Region = Niamey | -0.2130217 | -0.1621862 | -0.0508355 | 0.080528 |
| Constant | 2.2808670 | 2.1393310 | 0.1415362 | 0.1435971 |

b = consistent under Ho and Ha; obtained from ivregress
B = inconsistent under Ha, efficient under Ho; obtained from regress
Test: Ho: difference in coefficients not systematic
Chi2(25) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1.36
Prob>chi2 = 1.000
(V_b-V_B is not positive definite)

Table 9. Poverty level and number of aid projects (all funding combined and aid-only funding)

| | Poverty level of household in 2005 (0:richest - 9:poorest) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (25) | (26) | (27) | (28) | (29) | (30) | (31) | (32) |
| Number of aid projects | 0.054 | 0.079 | 0.082 | 0.081 | | | | |
| | [0.028] | [0.022]** | [0.021]** | [0.022]** | | | | |
| Number of aid projects, squared | -0.002 | -0.004 | -0.004 | -0.004 | | | | |
| | [0.002] | [0.002]* | [0.002]* | [0.002]* | | | | |
| Number of projects funded only by aid | | | | | 0.073 | 0.124 | 0.12 | 0.106 |
| | | | | | [0.105] | [0.080] | [0.078] | [0.080] |
| Number of projects funded by aid only, squared | | | | | 0.006 | -0.007 | -0.007 | -0.005 |
| | | | | | [0.023] | [0.016] | [0.016] | [0.016] |
| Household consulted about project to do (1:yes, 0:no) | | -0.078 | -0.086 | -0.065 | | -0.064 | -0.072 | -0.056 |
| | | [0.047] | [0.046] | [0.051] | | [0.048] | [0.048] | [0.051] |
| Household size | | -0.01 | -0.013 | -0.012 | | -0.011 | -0.013 | -0.012 |
| | | [0.006] | [0.006]* | [0.006] | | [0.006] | [0.006]* | [0.006] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | 0.336 | 0.337 | 0.335 | | 0.335 | 0.336 | 0.335 |
| | | [0.023]** | [0.023]** | [0.023]** | | [0.023]** | [0.023]** | [0.023]** |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | 0.42 | 0.412 | 0.413 | | 0.418 | 0.411 | 0.412 |
| | | [0.018]** | [0.018]** | [0.019]** | | [0.018]** | [0.018]** | [0.019]** |
| Urban household (1:yes, 0:no) | | 0.079 | 0.232 | 0.212 | | 0.083 | 0.232 | 0.228 |
| | | [0.058] | [0.057]** | [0.066]** | | [0.060] | [0.059]** | [0.069]** |
| Age of the household head | | | 0.002 | 0.002 | | | 0.002 | 0.002 |
| | | | [0.002] | [0.002] | | | [0.002] | [0.002] |
| Sex of household head is female (1:yes, 0:no) | | | -0.046 | -0.051 | | | -0.018 | -0.02 |
| | | | [0.145] | [0.142] | | | [0.146] | [0.144] |
| Education = Islamic | | | 0 | 0 | | | 0.004 | 0.001 |
| | | | [0.053] | [0.053] | | | [0.054] | [0.054] |
| Education = Read & Write | | | -0.039 | -0.043 | | | 0.009 | 0.007 |
| | | | [0.146] | [0.147] | | | [0.151] | [0.152] |
| Education = Primary | | | -0.075 | -0.081 | | | -0.06 | -0.065 |
| | | | [0.075] | [0.075] | | | [0.074] | [0.074] |
| Education = Secondary | | | -0.525 | -0.532 | | | -0.511 | -0.513 |
| | | | [0.107]** | [0.106]** | | | [0.108]** | [0.107]** |
| Education = Professional / Technical | | | -1.014 | -1.002 | | | -0.992 | -0.981 |
| | | | [0.126]** | [0.126]** | | | [0.128]** | [0.128]** |
| Education = University | | | -1.255 | -1.235 | | | -1.255 | -1.226 |
| | | | [0.142]** | [0.141]** | | | [0.137]** | [0.137]** |
| Marital status = Married monogamous | | | -0.034 | -0.031 | | | -0.05 | -0.054 |
| | | | [0.152] | [0.152] | | | [0.150] | [0.150] |
| Marital status = Married polygamous | | | -0.03 | -0.032 | | | -0.041 | -0.052 |
| | | | [0.161] | [0.162] | | | [0.160] | [0.160] |
| Marital status = Widow(er)/Divorced/Separated | | | 0.22 | 0.231 | | | 0.19 | 0.189 |
| | | | [0.203] | [0.200] | | | [0.202] | [0.199] |
| Region = Diffa | | | | -0.173 | | | | -0.067 |
| | | | | [0.141] | | | | [0.144] |
| Region = Dosso | | | | -0.192 | | | | -0.15 |
| | | | | [0.122] | | | | [0.127] |
| Region = Maradi | | | | -0.169 | | | | -0.127 |
| | | | | [0.127] | | | | [0.134] |
| Region = Tahoua | | | | -0.115 | | | | -0.083 |
| | | | | [0.128] | | | | [0.132] |
| Region = Tillaberi | | | | -0.218 | | | | -0.219 |
| | | | | [0.121] | | | | [0.125] |
| Region = Zinder | | | | -0.261 | | | | -0.212 |
| | | | | [0.114]* | | | | [0.120] |
| Region = Niamey | | | | -0.161 | | | | -0.176 |
| | | | | [0.121] | | | | [0.126] |
| Observations | 6689 | 6667 | 6667 | 6667 | 6689 | 6667 | 6667 | 6667 |
| R-squared | 0.002 | 0.408 | 0.424 | 0.426 | 0.002 | 0.405 | 0.422 | 0.423 |

Robust standard errors in brackets

* significant at 5% level; ** significant at 1% level

Table 10. Relationship between poverty change and aid projects

| | Difference in poverty between 2000 and 2005 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (33) | (34) | (35) | (36) | (37) | (38) | (39) | (40) |
| Dummy: Project funded by aid ($G_{1a}$) vs No aid ($G_2$+$G_{1b}$) | 0.239 | 0.199 | 0.223 | 0.191 | | | | |
| | [0.073]** | [0.101] | [0.074]** | [0.081]* | | | | |
| Dummy: Project funded by aid ($G_{1a}$) vs No aid ($G_2$) | | | | | 0.116 | 0.097 | 0.19 | 0.117 |
| | | | | | [0.099] | [0.166] | [0.123] | [0.124] |
| Change in access to education = unchanged | | 0.141 | 0.069 | 0.064 | | 0.323 | 0.257 | 0.281 |
| | | [0.164] | [0.126] | [0.126] | | [0.248] | [0.176] | [0.180] |
| Change in access to education = improved | | -0.017 | -0.062 | -0.059 | | 0.038 | -0.057 | -0.06 |
| | | [0.109] | [0.086] | [0.085] | | [0.165] | [0.127] | [0.130] |
| Change in access to electricity = unchanged | | -0.083 | -0.168 | -0.169 | | -0.074 | -0.098 | 0.026 |
| | | [0.134] | [0.114] | [0.113] | | [0.206] | [0.162] | [0.139] |
| Change in access to electricity = improved | | -0.166 | -0.219 | -0.167 | | -0.189 | -0.244 | -0.074 |
| | | [0.142] | [0.121] | [0.118] | | [0.203] | [0.181] | [0.165] |
| Change in access to health = unchanged | | -0.078 | 0.023 | -0.039 | | 0.346 | 0.228 | 0.126 |
| | | [0.158] | [0.130] | [0.130] | | [0.237] | [0.186] | [0.193] |
| Change in access to health = improved | | -0.141 | -0.051 | -0.09 | | 0.102 | 0.068 | 0.022 |
| | | [0.109] | [0.099] | [0.098] | | [0.158] | [0.136] | [0.132] |
| Change in access to justice = unchanged | | 0.037 | 0.095 | 0.098 | | -0.159 | -0.121 | -0.064 |
| | | [0.113] | [0.084] | [0.084] | | [0.167] | [0.118] | [0.118] |
| Change in access to justice = improved | | -0.266 | -0.199 | -0.202 | | -0.591 | -0.412 | -0.37 |
| | | [0.106]* | [0.081]* | [0.078]** | | [0.144]** | [0.111]** | [0.111]** |
| Change in access to water = unchanged | | -0.19 | -0.248 | -0.216 | | -0.337 | -0.486 | -0.484 |
| | | [0.121] | [0.106]* | [0.108]* | | [0.203] | [0.148]** | [0.154]** |
| Change in access to water = improved | | -0.072 | -0.133 | -0.139 | | -0.174 | -0.304 | -0.29 |
| | | [0.097] | [0.080] | [0.081] | | [0.146] | [0.108]** | [0.113]* |
| Age of the household head | | | 0.006 | 0.005 | | | 0.011 | 0.009 |
| | | | [0.002]* | [0.003] | | | [0.003]** | [0.003]** |
| Household consulted about project to do (1:yes, 0:no) | | | -0.058 | -0.048 | | | -0.17 | -0.171 |
| | | | [0.080] | [0.082] | | | [0.100] | [0.107] |
| Household size | | | -0.007 | 0.001 | | | -0.021 | -0.009 |
| | | | [0.009] | [0.011] | | | [0.012] | [0.013] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | | 0.261 | 0.263 | | | 0.27 | 0.254 |
| | | | [0.029]** | [0.029]** | | | [0.040]** | [0.042]** |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | | -0.551 | -0.566 | | | -0.584 | -0.588 |
| | | | [0.024]** | [0.025]** | | | [0.036]** | [0.038]** |
| Urban household (1:yes, 0:no) | | | 0.065 | 0.274 | | | 0.043 | 0.281 |
| | | | [0.093] | [0.101]** | | | [0.132] | [0.124]* |
| Sex of household head is female (1:yes, 0:no) | | | | -0.208 | | | | 0.059 |
| | | | | [0.213] | | | | [0.270] |
| Education = Islamic | | | | 0.104 | | | | -0.011 |
| | | | | [0.083] | | | | [0.111] |
| Education = Read & Write | | | | 0.129 | | | | 0.264 |
| | | | | [0.225] | | | | [0.278] |
| Education = Primary | | | | 0.091 | | | | 0.16 |
| | | | | [0.103] | | | | [0.129] |
| Education = Secondary | | | | -0.568 | | | | -0.597 |
| | | | | [0.151]** | | | | [0.234]* |
| Education = Professional / Technical | | | | -0.854 | | | | -1.03 |
| | | | | [0.190]** | | | | [0.216]** |
| Education = University | | | | -1.085 | | | | -1.071 |
| | | | | [0.169]** | | | | [0.352]** |
| Marital status = Married monogamous | | | | 0.133 | | | | 1.027 |
| | | | | [0.242] | | | | [0.367]** |
| Marital status = Married polygamous | | | | -0.015 | | | | 0.894 |
| | | | | [0.258] | | | | [0.375]* |
| Marital status = Widow(er)/Divorced/Separated | | | | 0.518 | | | | 1.244 |
| | | | | [0.312] | | | | [0.434]** |
| Region = Diffa | | | | 0.037 | | | | 0.544 |
| | | | | [0.364] | | | | [0.418] |
| Region = Dosso | | | | -0.024 | | | | 0.526 |
| | | | | [0.358] | | | | [0.415] |
| Region = Maradi | | | | -0.091 | | | | 0.485 |
| | | | | [0.355] | | | | [0.417] |
| Region = Tahoua | | | | 0.09 | | | | 1.163 |
| | | | | [0.360] | | | | [0.422]** |
| Region = Tillaberi | | | | -0.169 | | | | 0.469 |
| | | | | [0.360] | | | | [0.442] |
| Region = Zinder | | | | -0.125 | | | | 0.469 |
| | | | | [0.350] | | | | [0.403] |
| Region = Niamey | | | | -0.147 | | | | 0.367 |
| | | | | [0.349] | | | | [0.401] |
| Observations | 6679 | 2659 | 2654 | 2654 | 3248 | 1321 | 1320 | 1320 |
| R-squared | 0.005 | 0.018 | 0.346 | 0.371 | 0.001 | 0.04 | 0.377 | 0.413 |

Robust standard errors in brackets
* significant at 5% level; ** significant at 1% level

Table 11. Relationship between poverty change and aid projects

| | Difference in poverty between 2000 and 2005 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (41) | (42) | (43) | (44) | (45) | (46) | (47) | (48) |
| Dummy: Project from aid (1) vs Project from others (0) | 0.283 | 0.226 | 0.239 | 0.202 | | | | |
| | [0.076]** | [0.102]* | [0.077]** | [0.085]* | | | | |
| Project funded only by aid (1:yes, 0:no) | | | | | -0.046 | -0.099 | -0.046 | -0.078 |
| | | | | | [0.130] | [0.188] | [0.131] | [0.134] |
| Change in access to education = unchanged | | -0.084 | -0.151 | -0.166 | | -0.022 | -0.047 | 0.003 |
| | | [0.188] | [0.131] | [0.132] | | [0.347] | [0.195] | [0.199] |
| Change in access to education = improved | | -0.077 | -0.082 | -0.075 | | -0.096 | -0.089 | -0.09 |
| | | [0.120] | [0.091] | [0.090] | | [0.203] | [0.148] | [0.155] |
| Change in access to electricity = unchanged | | -0.021 | -0.088 | -0.102 | | 0.091 | 0.01 | 0.058 |
| | | [0.139] | [0.124] | [0.133] | | [0.263] | [0.228] | [0.216] |
| Change in access to electricity = improved | | -0.158 | -0.168 | -0.109 | | -0.136 | -0.19 | -0.031 |
| | | [0.150] | [0.128] | [0.134] | | [0.266] | [0.236] | [0.232] |
| Change in access to health = unchanged | | -0.138 | 0.068 | 0 | | 0.368 | 0.317 | 0.206 |
| | | [0.167] | [0.127] | [0.126] | | [0.266] | [0.207] | [0.206] |
| Change in access to health = improved | | -0.163 | -0.038 | -0.068 | | 0.13 | 0.049 | 0.033 |
| | | [0.114] | [0.101] | [0.102] | | [0.190] | [0.163] | [0.159] |
| Change in access to justice = unchanged | | 0.091 | 0.18 | 0.169 | | -0.141 | -0.034 | 0.002 |
| | | [0.124] | [0.088]* | [0.087] | | [0.202] | [0.133] | [0.134] |
| Change in access to justice = improved | | -0.203 | -0.135 | -0.151 | | -0.564 | -0.359 | -0.358 |
| | | [0.116] | [0.089] | [0.084] | | [0.184]** | [0.131]** | [0.131]** |
| Change in access to water = unchanged | | -0.216 | -0.194 | -0.173 | | -0.466 | -0.413 | -0.421 |
| | | [0.128] | [0.113] | [0.114] | | [0.249] | [0.175]* | [0.187]* |
| Change in access to water = improved | | -0.023 | -0.053 | -0.09 | | -0.144 | -0.229 | -0.281 |
| | | [0.106] | [0.085] | [0.084] | | [0.182] | [0.124] | [0.127]* |
| Age of the household head | | | 0.006 | 0.005 | | | 0.01 | 0.009 |
| | | | [0.003]* | [0.003] | | | [0.004]** | [0.004]* |
| Household consulted about project to do (1:yes, 0:no) | | | 0.02 | 0.049 | | | -0.047 | -0.003 |
| | | | [0.088] | [0.087] | | | [0.111] | [0.117] |
| Household size | | | -0.007 | 0 | | | -0.027 | -0.02 |
| | | | [0.011] | [0.012] | | | [0.014]* | [0.015] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | | 0.274 | 0.279 | | | 0.312 | 0.309 |
| | | | [0.031]** | [0.031]** | | | [0.041]** | [0.042]** |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | | -0.575 | -0.597 | | | -0.652 | -0.664 |
| | | | [0.024]** | [0.025]** | | | [0.036]** | [0.039]** |
| Urban household (1:yes, 0:no) | | | 0.157 | 0.296 | | | 0.207 | 0.289 |
| | | | [0.098] | [0.111]** | | | [0.147] | [0.156] |
| Sex of household head is female (1:yes, 0:no) | | | | -0.416 | | | | -0.405 |
| | | | | [0.237] | | | | [0.295] |
| Education = Islamic | | | | 0.121 | | | | -0.064 |
| | | | | [0.093] | | | | [0.141] |
| Education = Read & Write | | | | 0.015 | | | | 0.099 |
| | | | | [0.238] | | | | [0.301] |
| Education = Primary | | | | 0.118 | | | | 0.19 |
| | | | | [0.105] | | | | [0.141] |
| Education = Secondary | | | | -0.614 | | | | -0.74 |
| | | | | [0.155]** | | | | [0.276]** |
| Education = Professional / Technical | | | | -0.829 | | | | -1.125 |
| | | | | [0.207]** | | | | [0.276]** |
| Education = University | | | | -1.158 | | | | -1.479 |
| | | | | [0.142]** | | | | [0.305]** |
| Marital status = Married monogamous | | | | 0.044 | | | | 0.884 |
| | | | | [0.251] | | | | [0.495] |
| Marital status = Married polygamous | | | | -0.141 | | | | 0.74 |
| | | | | [0.267] | | | | [0.501] |
| Marital status = Widow(er)/Divorced/Separated | | | | 0.591 | | | | 1.467 |
| | | | | [0.338] | | | | [0.547]** |
| Region = Diffa | | | | -0.417 | | | | -0.379 |
| | | | | [0.308] | | | | [0.369] |
| Region = Dosso | | | | -0.345 | | | | -0.138 |
| | | | | [0.287] | | | | [0.347] |
| Region = Maradi | | | | -0.515 | | | | -0.332 |
| | | | | [0.288] | | | | [0.346] |
| Region = Tahoua | | | | -0.352 | | | | 0.326 |
| | | | | [0.300] | | | | [0.383] |
| Region = Tillaberi | | | | -0.641 | | | | -0.615 |
| | | | | [0.295]* | | | | [0.387] |
| Region = Zinder | | | | -0.605 | | | | -0.433 |
| | | | | [0.283]* | | | | [0.336] |
| Region = Niamey | | | | -0.464 | | | | -0.183 |
| | | | | [0.281] | | | | [0.409] |
| Observations | 5367 | 2262 | 2257 | 2257 | 1936 | 924 | 923 | 923 |
| R-squared | 0.008 | 0.018 | 0.371 | 0.402 | 0 | 0.038 | 0.435 | 0.478 |

Robust standard errors in brackets
* significant at 5% level; ** significant at 1% level

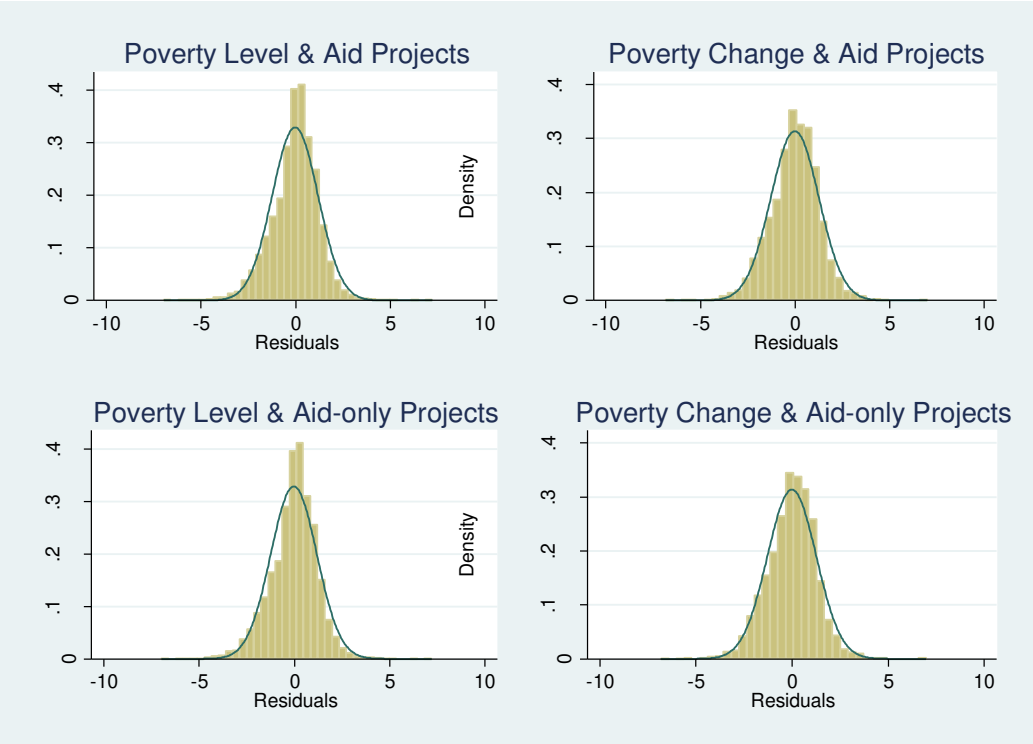
Table 12. Relationship between poverty change and number of aid projects (all funding sources and aid-only projects)

| | Change in poverty between 2000 and 2005 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (49) | (50) | (51) | (52) | (53) | (54) | (55) | (56) |
| Number of projects funded by aid | 0.086 | 0.094 | 0.082 | 0.075 | | | | |
| | [0.028]** | [0.038]* | [0.024]** | [0.026]** | | | | |
| Number of projects funded by aid, squared | -0.006 | -0.007 | -0.005 | -0.004 | | | | |
| | [0.003]* | [0.003] | [0.002]* | [0.002]* | | | | |
| Number of projects funded only by aid | | | | | 0.079 | -0.01 | 0.068 | 0.05 |
| | | | | | [0.115] | [0.172] | [0.122] | [0.125] |
| Number of projects funded by aid only, squared | | | | | -0.002 | 0.02 | -0.005 | -0.003 |
| | | | | | [0.024] | [0.033] | [0.028] | [0.028] |
| Change in access to education = unchanged | | 0.15 | 0.08 | 0.069 | | 0.139 | 0.068 | 0.054 |
| | | [0.166] | [0.126] | [0.127] | | [0.161] | [0.125] | [0.125] |
| Change in access to education = improved | | -0.012 | -0.05 | -0.055 | | -0.014 | -0.054 | -0.058 |
| | | [0.108] | [0.085] | [0.085] | | [0.109] | [0.087] | [0.086] |
| Change in access to electricity = unchanged | | -0.076 | -0.197 | -0.16 | | -0.071 | -0.211 | -0.163 |
| | | [0.136] | [0.122] | [0.114] | | [0.133] | [0.122] | [0.116] |
| Change in access to electricity = improved | | -0.159 | -0.205 | -0.163 | | -0.142 | -0.198 | -0.154 |
| | | [0.143] | [0.124] | [0.118] | | [0.140] | [0.125] | [0.121] |
| Change in access to health = unchanged | | -0.085 | -0.024 | -0.043 | | -0.086 | -0.023 | -0.042 |
| | | [0.156] | [0.131] | [0.130] | | [0.157] | [0.134] | [0.132] |
| Change in access to health = improved | | -0.144 | -0.075 | -0.094 | | -0.124 | -0.064 | -0.092 |
| | | [0.109] | [0.099] | [0.098] | | [0.110] | [0.099] | [0.098] |
| Change in access to justice = unchanged | | 0.031 | 0.088 | 0.095 | | 0.043 | 0.102 | 0.105 |
| | | [0.113] | [0.084] | [0.084] | | [0.114] | [0.085] | [0.084] |
| Change in access to justice = improved | | -0.267 | -0.203 | -0.204 | | -0.263 | -0.197 | -0.204 |
| | | [0.106]* | [0.078]* | [0.078]** | | [0.104]* | [0.078]* | [0.077]** |
| Change in access to water = unchanged | | -0.181 | -0.208 | -0.209 | | -0.199 | -0.225 | -0.218 |
| | | [0.122] | [0.107] | [0.109] | | [0.120] | [0.107]* | [0.109]* |
| Change in access to water = improved | | -0.076 | -0.122 | -0.141 | | -0.067 | -0.109 | -0.13 |
| | | [0.097] | [0.081] | [0.081] | | [0.097] | [0.084] | [0.083] |
| Age of the household head | | | 0.005 | 0.005 | | | 0.005 | 0.005 |
| | | | [0.003] | [0.003] | | | [0.003] | [0.003] |
| Household consulted about project to do (1:yes, 0:no) | | | -0.077 | -0.044 | | | -0.052 | -0.023 |
| | | | [0.078] | [0.082] | | | [0.079] | [0.083] |
| Household size | | | 0.001 | 0.001 | | | 0.001 | 0.001 |
| | | | [0.010] | [0.011] | | | [0.010] | [0.011] |
| Poverty level of community in 2005 (0:richest - 9:poorest) | | | 0.265 | 0.261 | | | 0.269 | 0.264 |
| | | | [0.029]** | [0.029]** | | | [0.028]** | [0.029]** |
| Poverty level of household in 2000 (0:richest - 9:poorest) | | | -0.564 | -0.565 | | | -0.564 | -0.566 |
| | | | [0.025]** | [0.025]** | | | [0.025]** | [0.025]** |
| Sex of household head is female (1:yes, 0:no) | | | -0.215 | -0.217 | | | -0.198 | -0.195 |
| | | | [0.212] | [0.212] | | | [0.214] | [0.214] |
| Urban household (1:yes, 0:no) | | | 0.254 | 0.268 | | | 0.242 | 0.273 |
| | | | [0.092]** | [0.101]** | | | [0.094]* | [0.103]** |
| Education = Islamic | | | 0.113 | 0.108 | | | 0.116 | 0.102 |
| | | | [0.082] | [0.082] | | | [0.084] | [0.084] |
| Education = Read & Write | | | 0.114 | 0.113 | | | 0.162 | 0.152 |
| | | | [0.220] | [0.221] | | | [0.225] | [0.225] |
| Education = Primary | | | 0.092 | 0.085 | | | 0.118 | 0.107 |
| | | | [0.102] | [0.103] | | | [0.102] | [0.103] |
| Education = Secondary | | | -0.568 | -0.563 | | | -0.552 | -0.544 |
| | | | [0.160]** | [0.152]** | | | [0.159]** | [0.152]** |
| Education = Professional / Technical | | | -0.872 | -0.859 | | | -0.86 | -0.839 |
| | | | [0.191]** | [0.190]** | | | [0.190]** | [0.190]** |
| Education = University | | | -1.131 | -1.086 | | | -1.141 | -1.084 |
| | | | [0.167]** | [0.170]** | | | [0.164]** | [0.167]** |
| Marital status = Married monogamous | | | 0.144 | 0.139 | | | 0.148 | 0.133 |
| | | | [0.243] | [0.245] | | | [0.237] | [0.241] |
| Marital status = Married polygamous | | | 0.003 | -0.009 | | | 0.009 | -0.012 |
| | | | [0.258] | [0.260] | | | [0.254] | [0.257] |
| Marital status = Widow(er)/Divorced/Separated | | | 0.527 | 0.527 | | | 0.523 | 0.509 |
| | | | [0.315] | [0.313] | | | [0.313] | [0.312] |
| Region = Diffa | | | | 0.024 | | | | 0.119 |
| | | | | [0.363] | | | | [0.371] |
| Region = Dosso | | | | -0.042 | | | | 0.034 |
| | | | | [0.359] | | | | [0.363] |
| Region = Maradi | | | | -0.088 | | | | -0.042 |
| | | | | [0.354] | | | | [0.361] |
| Region = Tahoua | | | | 0.086 | | | | 0.117 |
| | | | | [0.360] | | | | [0.368] |
| Region = Tillaberi | | | | -0.176 | | | | -0.183 |
| | | | | [0.360] | | | | [0.366] |
| Region = Zinder | | | | -0.128 | | | | -0.069 |
| | | | | [0.350] | | | | [0.357] |
| Region = Niamey | | | | -0.146 | | | | -0.152 |
| | | | | [0.348] | | | | [0.356] |
| Observations | 6679 | 2659 | 2654 | 2654 | 6679 | 2659 | 2654 | 2654 |
| R-squared | 0.005 | 0.021 | 0.37 | 0.372 | 0.001 | 0.016 | 0.365 | 0.368 |

Robust standard errors in brackets
* significant at 5% level; ** significant at 1% level

Figure 10. Relationships poverty-number of aid projects with quadratic fit and 95% confidence interval


Figure 11. Residuals of relationships estimated poverty-number of aid projects, with normal distribution curve



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